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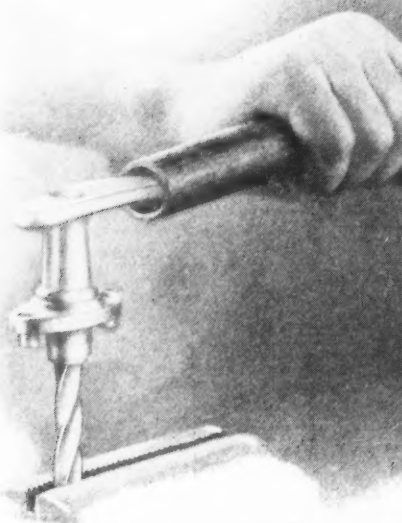


IN any motor vehicle the bearings are finally responsible for putting the power to work surely, smoothly, quietly, and economically. In transmissions, differentials, pinion or worm drives, rear wheels, front wheels, steering pivots, and fans, Timken Bearings preserve these qualities to the utmost. Timkens are more than anti-friction bearings. There is *complete* wear-protection in Timken-made electric steel, Timken *POSITIVELY ALIGNED ROLLS* and the higher thrust and radial capacity of Timken tapered construction.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

Test for Strength

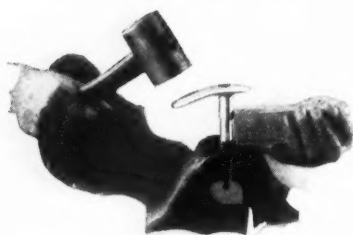
In this test the steel shank of a Ternstedt zinc-base, die-cast door handle was clamped securely in a vise. By means of an iron pipe placed over the tip of handle grip sufficient pressure was exerted to completely corkscrew the steel shank. Yet the die-cast handle section exhibited no tendency to either crack or break.



Will YOUR door handles *Stand this test?*

Test for Malleability

Blows from a mallet were directed against the extreme tip of grip of a Ternstedt zinc-base, die-cast door handle. Without cracking or breaking, the grip was bent downward to a full inch out of true. Malleability, such as this, is not found in the zinc-base, die-cast door handle of ordinary manufacture.



Ternstedt Handles *will*

No ordinary zinc-base, die-cast door handle could possibly undergo as severe a test and not crack under the strain. For no other manufacturer has been able to produce this type of casting with the accuracy of Ternstedt manufacture.

It is Ternstedt control of materials and production that gives to Ternstedt handles their exceptional strength. It is the Ternstedt method of making which endows them with their unusual malleability—a malleability that closely approximates brass—never equalled elsewhere in a zinc-base casting.

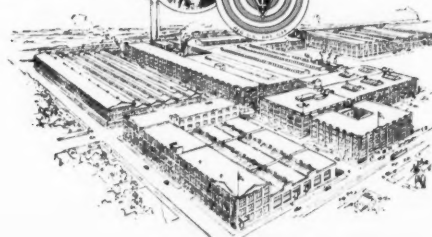
Ternstedt, alone, is in position to produce these highly desirable qualities.

TERNSTEDT

World's Largest Manufacturer of Automobile Body Hardware

DETROIT

U. S. A.



Outlook is Good for Automotive Sales in 2nd Quarter

Will likely run behind corresponding period of 1926, however, as was case during first three months. General Motors continues to show big gain. Ford is still lagging.

By Norman G. Shidle



TAKING the passenger car industry as a whole, factory output was held pretty well in line with sales during the first quarter and seems likely to be continued on that basis for the next quarter.

Complete sales figures for the first three months are not yet available, of course, but detailed statistics from a number of important areas and general reports from the entire country indicate a continuance for the first and second quarters of 1927 of the rather uneven distribution of business among companies which characterized the entire year of 1926. General Motors as a whole continues to run very far ahead of 1926 in retail sales with Chevrolet and Pontiac the outstanding contributors to this numerical advance. The big organization increased dealers' new car stocks by some 40,000 during January and February, not a large increase on a volume which probably will run over 100,000 a month for the next few months. Dealer stocks in nearly all lines are lower than at this time last year, however, and retailers in general are in good shape in this regard.

Chrysler, Chevrolet, Essex, Pontiac and a few others, made outstanding advances in sales in a number of big cities during the first quarter, with Ford and two or three other lines being responsible for fairly severe declines which made retail sales for the industry as a whole run 10 to 20 per cent below last year.

The outlook for second quarter passenger car sales

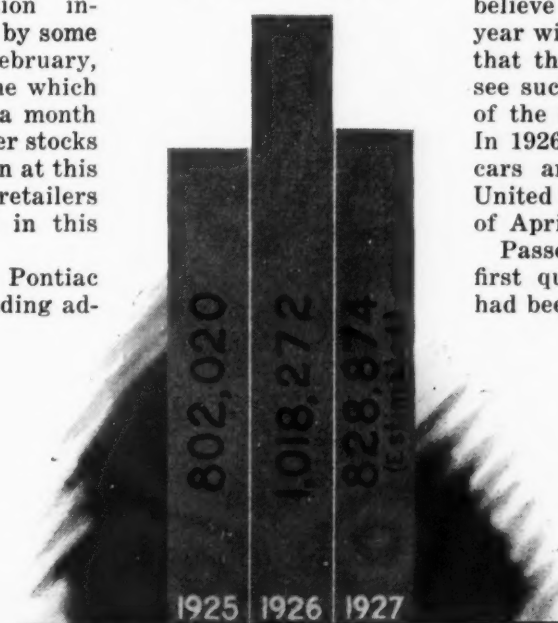
is good, but as in the quarter just passed, the total number of cars disposed of may be somewhat less than for the same period in 1926. Sales in several important lines which have not been satisfactory in the first quarter seem almost certain to speed up in the next three months, while continued progress among those which have been leading thus far is indicated. For that reason, second quarter output and sales may not run behind 1926 by so great a margin as did the first quarter.

In making comparisons with 1926, however, it should be remembered that output last year was unusually heavy in the first half of the year and that an unusually large proportion of the year's total output was made in the first two quarters.

There are a good many observers who believe that business throughout this year will be more even in character and that the last half of the year will not see such great declines from the totals of the first half as occurred last year. In 1926 there were 1,154,783 passenger cars and 152,968 trucks produced in United States and Canada in the months of April, May and June.

Passenger car production during the first quarter ran along very much as had been expected by most observers of the industry. Both manufacturing schedules and sales for the industry as a whole have run behind 1926 by a considerable margin, the production decrease for the first two months being in the neighborhood of 28 per cent. With March output around 360,000 to 375,000 the first quarter of 1927

1st Quarter Sales of Passenger Cars 1925-1926-1927



was somewhere between 20 and 25 per cent below that of 1926.

The very large decline in Ford sales and production, of course, accounts for a major part of the decrease, but the totals show that despite good increases by certain other companies, the gains by Ford's competitors have not been as great as the losses by Ford.

The Ford situation, as a matter of fact, is one of the things which may throw awry much of the guessing about production and sales totals which may be done at this time. Ford, it now seems certain, will have a new model on the market before the end of this year. It is almost equally certain that his sales will climb very materially as a result, not only because of the increased public demand for a more modern vehicle at the price of the present Ford, but also because of the greater enthusiasm almost sure to be generated in the Ford distributing organization. Just how great and how lasting this impetus will be, however, nobody can tell exactly and for that reason accurate guesses about total passenger car business for the current 12 months are even harder to make this year than usual.

Thus far 1927 has been unique in that it has been following predicted lines rather closely from an automotive standpoint. It was pretty generally felt around New York show time that the first quarter would be less than that of 1926, but there was an equally strong

to believe that the first three months' production this year represents any such large proportion of the total for the year which is to come.

Seasonal indexes of passenger car production, as a matter of fact, developed on the basis of figures covering 1920 to 1926 inclusive, show that normally the first two months can be expected to account for 13.7 per cent of the year's total output and the first three months for 22.7 per cent. Figuring 1927 as a normal year then, we might expect a total passenger car output for the year of about 3,600,000 as compared with 3,929,546 in 1926 and 3,835,801 in 1925.

Should the first three months of this year, on the other hand, turn out to have been slightly sub-normal the expected total for the year might well be estimated as very close to the 1925 figure.

This year, even more than ever, truck figures have to be separated from passenger car data if a true picture of either phase of the industry is to be presented. This becomes clearly evident when it is realized that, while passenger car output was falling off 27 per cent the first two months of this year as compared with the first two months of last year, truck production for the same two months recorded a 9.9 per cent gain as compared with 1926 and a 31.8 per cent gain as compared with 1925.

The truck figures seem to indicate a particularly favorable condition when it is realized that this increase has been made in the face of far more conservative retail financing terms than were common during the first quarter of 1926. Commercial vehicle sales, of course, have not been uniformly good for all lines in all sections of the country, but the data presented show definitely a good gain for the industry as a whole. In a few instances specific truck lines may be suffering slightly from emphasis being placed by dealers on new passenger car models of the same make but no marked adverse trend is discernible in any important line.

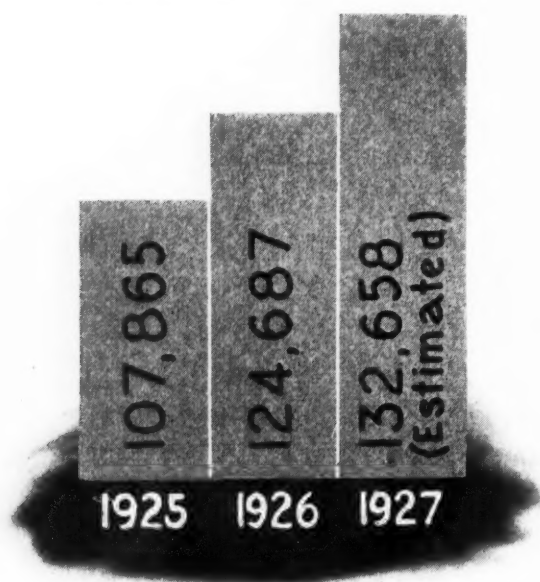
Several weeks ago it already had begun to be apparent that the truck industry had a good chance of running ahead of the production totals predicted by leading executives at the beginning of the year. Seasonal indexes of truck production, compiled on the same basis as the passenger car indexes already mentioned, indicate that normally about 13.3 per cent of total truck output is produced in the first two months of the year. If this be true in 1927, the final figures at the end of December would be in excess of 600,000 as against 535,197 in 1926 and 498,470 in 1925. While this normal proportion may not hold this year, there is now basis for the belief that truck manufacture in 1927 will go ahead of 1926 unless some entirely unforeseen general business factors of an adverse nature intervene.

Both cars and trucks started the year well as regards exports, although here again truck sales had a more marked and substantial gain over the first of 1926 than did passenger cars.

The Canadian production and export figures for the first quarter this year have a particular interest, because it was freely predicted by many Canadian authorities that the reduction in tariff on April 15, 1926, would be the ruination of the Canadian automotive manufacturing industry. Apparently no such ruination has come about, despite the dire predictions. Canadian car output this year, while behind that of last, is showing a decline of just about the same proportions as that recorded in the domestic plants. Canadian truck production is just about even with that of last year so far as the first quarter is concerned. Exports of both cars and trucks from Canada, moreover, are ahead of last year to just about the same extent as are exports of the

(Continued on page 530)

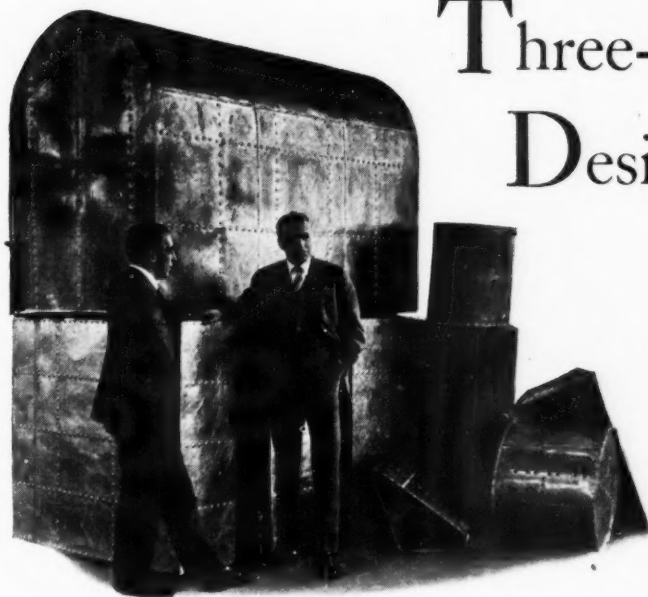
1st Quarter Truck Sales



opinion that reasonably good business would accrue to most manufacturers. Both of these expectations have been realized during the three months just passed.

The 1927 automotive business curve gives evidence of resembling the 1925 curve much more than it does the 1926 one up to the present time. January and February output this year, for instance, was just about 3.5 per cent greater than that of the same period in 1925. In 1925, moreover, about 12.2 per cent of the total passenger car output for the year was produced in the first two months and about 21.8 per cent in the first quarter. The fairly steady course of business this year indicates that something of the same proportions is going to hold in 1927. Last year the first two months accounted for nearly 16 per cent of the year's total and the first quarter for 26 per cent. This relatively large output was not normal, however, and there is no sound reason

Three-Engined "Pathfinder" Designed for Paris Flight



Lieut. Commander Noel Davis U.S.N. (left), and C. Talbot Porter, chief engineer of the Keystone Aircraft Corp., photographed alongside the fuel tanks of the "Pathfinder." Total capacity of the tanks is 1500 gal.

EARLY this coming summer Lieut. Commander Noel Davis, U. S. N., will hop off from New York with the expectation of making his first stop in Paris. This flight will be attempted for the Raymond Orteig prize of \$25,000.

The plane to be used is a special Pathfinder now being constructed by the Keystone Aircraft Corp. (formerly Huff-Daland Air Planes, Inc.), Bristol, Pa. The Pathfinder is a triple-engined biplane destined for commercial use which has been designed along the lines of the small Huff-Daland single-engine bombers furnished the army.

In the accompanying table are given specifications for the standard Pathfinder as well as for the particular job which Davis will use. The fuselage and center wing sections which support two of the Wright "Whirlwind," 220 hp. motors are constructed of welded steel tubing with duralumin tubing being used for many of the wing section parts. The wings are of the usual wood frame construction and have a total span of 67 ft., both upper and lower wings being of the same size and without stagger.

As can be seen in the accompanying sectional view of the ship, the wings are of thick section and the upper

wing is fitted with three gasoline tanks having a total capacity of 500 gal.

Keystone type, oleo hydraulic landing gear and tail skid are employed, the latter being fitted with control wires so that the ship can be steered while taxiing.

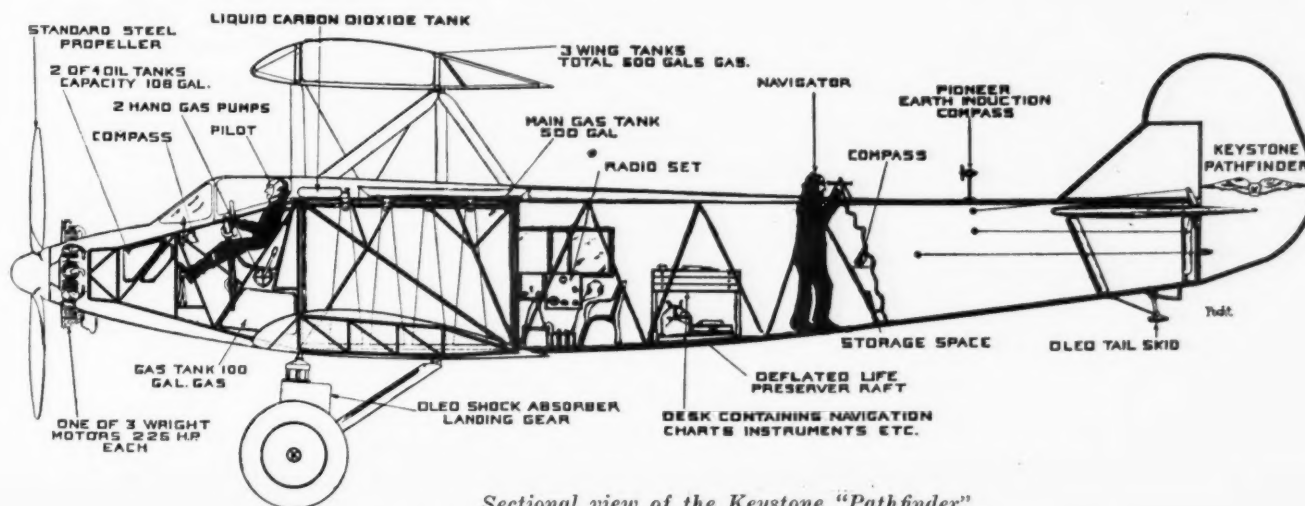
Directly back of the pilot's seat and inside the fuselage is a 900 gal. fuel tank. The three-wing tanks mentioned before hold 500 gal. more and another 100 gal. tank is located under the pilot's seat, thus providing 1500 gal. of fuel or enough to carry the ship 4500 miles, about 1000 miles farther than the intended flight.

The empty weight of the plane is 5878 lb. Crew of two, fuel, oil and equipment weigh 10,560 lb., making a total wing loading of 16,500 lb., approximately, or slightly over 14 lb. per sq. ft. of wing area.

For commercial use the fuselage fuel tank will be eliminated and the space it occupies will be refitted for passenger carrying. Under these conditions the plane will have a speed of 120 m.p.h., a pay load of 4500 lb., and a cruising range of 15 hr. or 1150 miles.

The specifications of the Keystone planes are as follows:

	Standard Commercial	Davis Special
Wing Span	67 ft.	do.
Length	44 ft. 11 $\frac{3}{4}$ in.	do.
Height	15 ft. 6 $\frac{1}{2}$ in.	do.
Wing Area	1,150 sq. ft.	do.
Weight Empty	5,878 lb.	do.
Weight Loaded	11,300 lb.	16,500 lb.
Engine	3 Wright "Whirlwinds"-660 hp.	
Wing Loading	9.8 lb./sq. ft.	14.3 lb./sq. ft.
Power Loading	17 lb./hp.	25 lb./hp.
Maximum Speed	120 m.p.h.	100 m.p.h., App.
Landing Speed	56 m.p.h.	60 m.p.h., App.
Rate of Climb	800 ft./min.	500 ft. per min.
Range	1,150 miles	4,500 miles
Endurance	15 hr.	50 hr., App.



Sectional view of the Keystone "Pathfinder"

Smaller 6-Cylinder Bus Model Added to *a. c. f.* Line

New job has 198-in. wheelbase and is powered with 332-cu. in. Hall-Scott engine. Two body styles offered.

By A. F. Denham

AMERICAN CAR & FOUNDRY MOTORS CO. has recently augmented its line of a.c.f. buses by the addition of a 198-in. wheelbase model of the mechanical drive type. A Hall-Scott six-cylinder, $3\frac{3}{4}$ by 5 in. engine is used and the chassis is available either with a 16 to 20-passenger parlor car, or a 23-passenger street car type of body.

The a.c.f. line has heretofore consisted of two 230-in. wheelbase models, one with mechanical drive, offered in parlor car and street car types, and the other a gas-electric design fitted with either street car or double-deck city service body. These models are also powered with Hall-Scott engines, which are of the same general design as that used for the 198-in. wheelbase model, but of a larger size. The bore and stroke of the larger engine is $4\frac{1}{4}$ by $5\frac{1}{2}$ in., giving a piston displacement of 468 cu. in.

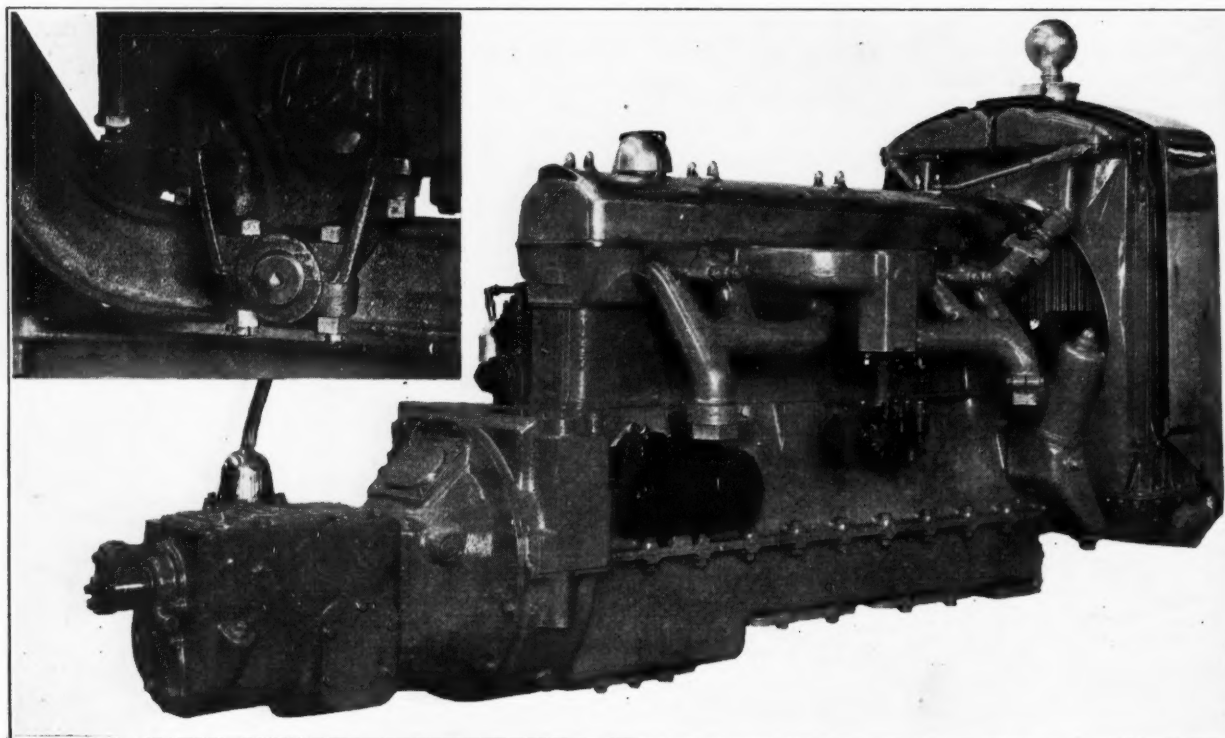
The smaller engine has a piston displacement of

332 cu. in. and develops around 56 hp. at 1800 r.p.m.

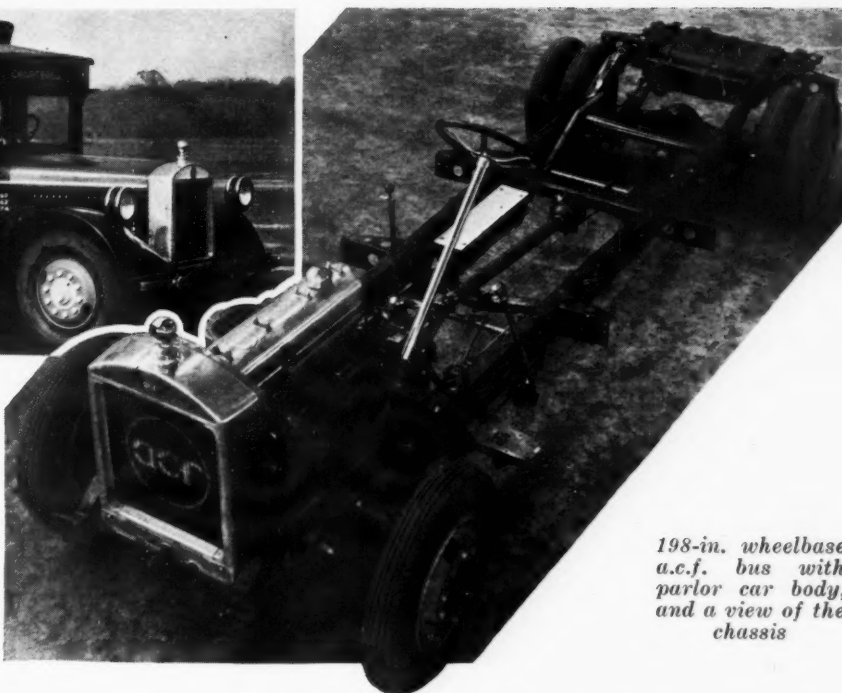
While the aluminum alloy crankcase of the Hall-Scott engine (in both sizes) is cast in two parts, it is not necessary to remove the lower half in order to change connecting rods or pistons, hand hold plates being provided for this purpose.

Cylinder blocks which are of semi-steel castings are very simple in design due to the overhead valve mechanism and camshaft. With the completely machined combustion chamber included in the head, the only machining necessary on the blocks is that of grinding the bores and surfacing top and bottom of the block. This method of construction enables American Car & Foundry to offer replacement blocks with new piston, pins and rings for \$105, practically eliminating the necessity of regrinding worn cylinder blocks.

On the whole there have been no radical changes in design in the Hall-Scott engine since acquisition of



Hall-Scott engine, showing offset gearshift lever and method of mounting radiator to engine. Inset—Trunnion type front engine support



198-in. wheelbase
a.c.f. bus with
parlor car body,
and a view of the
chassis

this company by American Car & Foundry, but a number of refinements have been made. Pistons are of aluminum alloy with split skirt, the cut in the skirt now being carried vertically to the third ring groove and then at right angles to both sides part way toward the piston pin bosses, at the bottom of the third ring groove. Five piston rings are fitted above the pin with one oil control type ring on the skirt. Full floating piston pins, which are of 1020 carbon steel, case hardened and ground, are assembled with a wringing fit in the piston without bushings. Conventional I-beam heat-treated alloy steel connecting rods are used.

Four main bearings support the crankshaft. Front end drive is by means of a Morse chain to the fan and accessories shafts, the overhead camshaft being driven by helical steel gears from the fanshaft. Manual adjustment of the chain is obtained by means of an eccentric bushing which serves as a mount for the accessories driveshaft sprocket, the accessories shaft being offset and connected to the sprocket shaft by an Oldham coupling, provided with an automatic take-up for wear. A change has been made in the specifications of the camshaft and oil pump drive gears which are now steel pinions instead of the fiber formerly used.

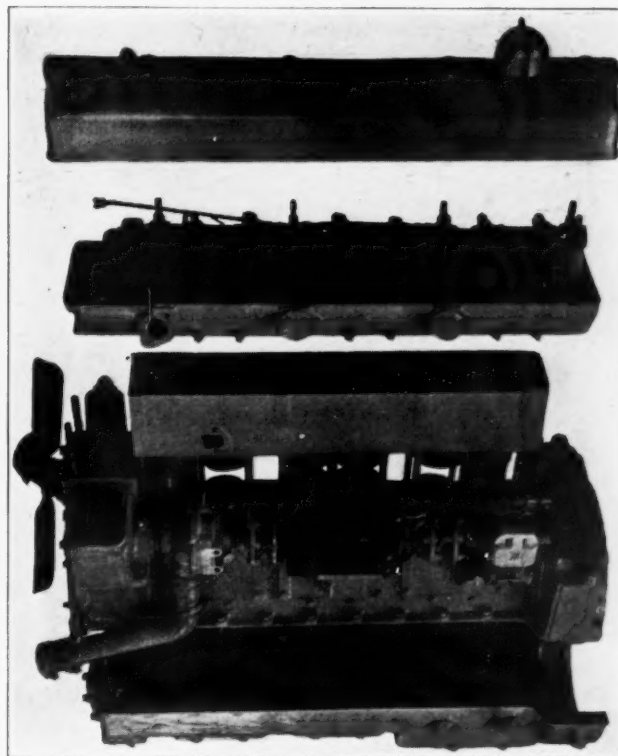
Four Camshaft Bearings

Four bearings are provided on the camshaft, bell crank rocker arms operating the silicon chrome steel valves which are fitted with double springs and are mounted at 20 deg. to the vertical. The complete camshaft and valve assembly is removable with the head, facilitating replacement.

Lubrication of the engine is by means of a gear pump located on the front end of the lower crankcase and driven from the crankshaft. Oil is forced through a Hall-Winslow oil filter of the felt disk type, and from the latter it is carried through drilled passages in the crankcase to the main bearings and the timing chain sprocket bearings. Crankpin bearings receive oil through the crankshaft, while camshaft bearings and rocker arms are also lubricated under pressure through a separate oil line passing through the left rear cylinder head hold-down bolt. From the camshaft bearings oil is discharged into the camshaft trough, the revolving cams creating a mist for lubrication of valve springs, guides, etc. A shield is provided in the head to prevent undue oil reaching the intake valve guides. The crankcase is ventilated by two breathers, one on the crankcase, the other on top of the valve cover.

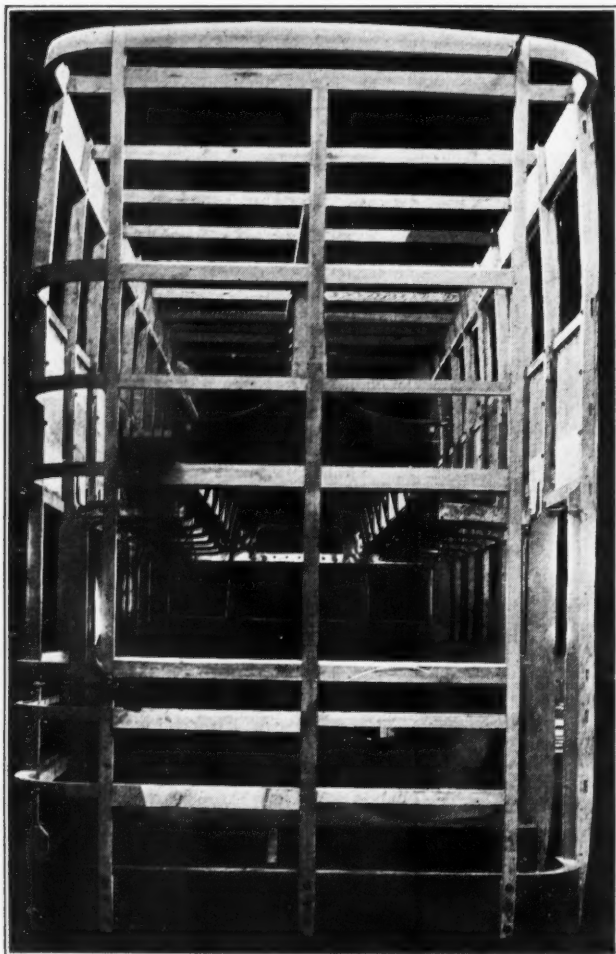
An unusual feature of the cooling system is that the radiator is carried by the engine. The cast lower tank is bolted to an extension of the crankcase and braced at the top by two inclined rods to the valve cover hold-down studs. This is said to reduce radiator troubles materially aside from simplifying complete powerplant replacement.

The ground and heat-treated stainless steel pump shaft is hollow and splined at the center. The driveshaft passes through the pump shaft with a loose fit at the splines, making the pump a complete removable unit. The radiator shell is of cast aluminum.



This view of the engine shows how the crankcase, cylinder block, cylinder head and valve cover are removed

Fuel is supplied to the engine through a Stewart vacuum feed in combination with a Zenith carburetor and a U-shaped manifold. A centrifugal governor is mounted on the front face of the camshaft gear and set for a maximum engine speed of 1800 r.p.m.



Frame construction of the a.c.f. double-deck bus body with inclosed rear stairway

Three-point suspension is used in mounting the engine. The rear is carried by an I-beam supported from the frame through Thermoid disks. At the front the engine has a trunnion support, secured to the front frame cross member well below the radiator, thus facilitating removal of the engine.

Electrical units are of Delco manufacture, a 12-volt system being used. Double contact arms are a feature of the automatic advance distributor. Two types of generators are available, according to body and service type, rated at 400 and 600 watts, respectively. Starter engagement is by means of a positive shift.

In the 230-in. wheelbase gas-electric model, the generator housing is secured by means of an adapter to the rear flywheel housing cover plate. The generator armature shaft itself is hollow, the generator driveshaft passing through it and being coupled to the armature shaft at both ends by means of rubber block universal points, providing a cushioned drive for the armature. Either General Electric or Westinghouse generators and motors are used, the two makes being interchangeable. The generator is rated at 200 amp. and 125 volts at 1200 r.p.m., 55 kw. being developed at governed speed. Underslung worm drives of 11 to 1 reduction gear the two motors to the rear axle driveshafts through single section propeller shafts and Spicer universals, the motors absorbing 85 amp. at

1550 r.p.m. Timken axles are used both front and rear, a feature of the rear axle being the provision on the outer end of the shafts of a spur gear spline fitting into an internal gear in the hub plate.

On the mechanical drive 230-in. chassis a 13-plate Brown-Lipe clutch and a four-speed Brown-Lipe transmission are mounted in unit with the engine. The mounting of the shift lever on the left side of the case is unusual and serves to clear the aisle of obstructions, the transmission brake lever being at the driver's left. Four Spicer universal joints are used in conjunction with the three-section propeller shaft, with the center section supported at both ends by self-adjusting SKF double-row ball bearings. Gear ratios of from 4.8 to 6.8 to 1 are available in the Timken worm drive, full-floating rear axle.

Two-Section Propeller Shaft

On the 198-in. wheelbase models similar construction is followed. The propeller shaft, however, is of the two-section type, a single self-aligning SKF bearing supporting the shaft.

Front axles on all models are of Timken manufacture. The section of the axle is 3 in. deep and $2\frac{3}{8}$ in. wide on the 230-in. models. Road clearance under the front axles is $7\frac{3}{4}$ in. with 8 in. under the rear axles on the 230-in. wheelbase chassis, while the turning radius on these models is 36 ft.

Westinghouse air brakes are fitted on the rear wheels of all 230-in. chassis, but front wheel brake equipment differs, the gas-electric buses being provided with air brakes at the front, and the mechanical drive models with internal expanding three-shoe Bendix brakes operated by the hand lever. On the gas-electric drive chassis the rear wheels can also be braked electrically by means of the controller handle.

On the 198-in. models, Bendix brakes are fitted front and rear, the hand lever on this chassis model operating the rear wheel brakes as on the gas-electric models. Leverage on all models is so arranged that the outer front wheel brake is released when turning corners to prevent interference with steering. On the models fitted with air brakes at the rear only, a 3 cu. ft. air compressor is driven directly through the accessories driveshaft from the generator, while on these models having air brakes on all four wheels, a 6 cu. ft. compressor is driven by an inclosed chain from the accessories shaft. The metal shoes in the airbrakes are designed to allow for $\frac{1}{2}$ in. of wear before replacement. Adjustment is by worm and wheel.

Ross cam and lever steering gears are standard equipment on all models. Spark and throttle control levers are mounted on the side of the steering column.

Budd pressed steel wheels are fitted on all chassis, rear wheels being of the dual type. Tires on the 230-in. wheelbase models are 38 x 7 high pressure on the mechanical drive type and 36 x 8 on the gas-electrics, while 34 x 7.50 balloons are supplied with the 198-in. models. Other sizes are optional.

Frames on all a.c.f. bus chassis are of the double drop type of pressed steel and heat treated.

Springs are practically flat under load and are provided with rubber stops to prevent spring deflection beyond 75 per cent of their elastic limit. Front springs are mounted above the axles while rear springs are underslung.

Bijur one-shot chassis lubricating systems are standard equipment on all buses, with Zerk pressure gun connections provided at the axles to obviate the use of flexible tubing at each point.

Future Economies in Production Will Come From Overhead

Further striking reductions in direct labor costs for specific automobile units not to be anticipated unless marked changes are made in present methods.

By W. L. Carver



FURTHER striking reductions in process or direct labor costs for specific automobile units are not to be anticipated unless marked changes in method which involve entirely different types of equipment are made.

Direct labor is the smallest item entering into the total cost of an automobile unit, which may be either a parts assembly or the complete vehicle. Therefore, it is likely that further marked economies must come out of the surrounding or fringe elements of corporate effort.

Former practice of measuring costs on the basis of direct labor charge plus a fixed percentage of burden or overhead is not applicable to the analysis of value of existing or proposed equipment. The old combination of prime labor cost plus a fixed overhead percentage is a simple, convenient accounting practice but tends to distort ideas of actual operating costs and accounts for the deficits which often appear to mar an otherwise good balance sheet at the end of a manufacturing period.

Machine tools, and, in fact, all kinds of plant equipment, no longer can be purchased from a purely mechanical point of view but also must be treated as investments which guarantee certain returns in line with a definite program incorporating all of the elements of corporate growth and health. In other words, all equipment must fit into a scheme which insures the necessary surplus on dividend dates.

Some method of analyzing the economic value of equipment which goes beyond present practice in both production and accounting departments is needed to round out complete consideration from investment and profit producing angles.

These are some of the channels into which production thought of today is turning as the result of growing appreciation of the rapidly changing basic characteristics of the industry. While there is some apparent continuity and association of these ideas and while they crop out in different forms in various shops, it must be realized that all of them are part and parcel of one underlying idea which is based on a very definite set of conditions.

In a broad way this idea and the underlying set of conditions can be outlined in the following statement: With the passing of the industry from the rapid expansion or boom period into the highly competitive period which already is at hand, basic economics of business administration, sales, production and allied effort no longer can be ignored or defied.

To enlarge upon the state of competition which exists in this industry today is almost platitudinous. In the boom days of the industry, any production expedient which stopped a gap temporarily and rushed more cars to dealers was good business. The market was

there waiting and the hallowed law of supply and demand justified the expense. The profit was hitched on after the expenditures were prorated and many companies made tremendous profits. It is this element of golden touch that makes criticism of almost any automotive practice a hollow task, because the honest viewpoint is, "Well, suppose they did overlook this or that detail, look at the success they have made."

Today conditions have changed and the industry is knee-deep in the same type of competition which characterizes the textile, shoe, electrical and other industries. One major point of difference exists, and that is, the automotive in-

THIS discussion of production costs and overhead is intended simply to drag some of the hidden expenses and losses out into the open and focus attention upon them.

Right now some production executives are beginning to realize that the everlasting, concentrated hammering on direct labor or production cost as it is understood generally is slightly futile in view of the more substantial economies which are ripe and almost ready to fall off the vine in the so-called overhead field.

Almost any plant in the industry stands to make most substantial savings by study of just two of the so-called overhead items—material handling and maintenance—and these will be the subject of another article to be published in a later issue.

dustry builds and sells the most complicated, expensive unit which has broad, popular consumption. Study of automotive profit and loss statements over the past two or three years shows a definite tendency toward smaller profits per unit of sale. At the same time there is widespread talk of amalgamation and elimination.

The pinch of competition on the sales department is only the shadow of the real load which already has alighted on the production and engineering departments. Disregarding simplification of design which arises in the engineering department, the real burden of meeting competition is up to the production department. As a matter of fact, engineering departments, in the last two or three years, have been busy refining and amplifying designs, thereby increasing the load on the production men. The general tendency for some time, which is just beginning to weaken, has been in the direction of building more car for the same sales price.

The production department is facing a long-haul condition in which pressure from the sales department will increase constantly and diminishing manufacturing allowances will prohibit about all of the "quick fire," about-face tactics of the first two decades of the industry's manufacturing history. The period of evolutionary rather than revolutionary growth and policies already is here in the minds of some of the foremost production executives. The plant and its equipment will be handled not in the light of what will stop the gap for this month or next but on the basis of how this year's program will merge into that of next and that of the years to come.

Following several years' liquidation of wartime stocks, machine tool development has been at an unusually high peak for the last three years. In fact, many automotive plants are not equipped up to the standard of existing machine tools. This is one of the elements of the slack which remains to be taken up in existing production departments. Many of the modern tools have reached almost the limit of existing knowledge of structural and cutting practice. In practically every instance further increase of productive ability cannot be attained on anything like a pro rata basis in which weight and price are the basis of computation. The present practice of absorbing the cost of production equipment which increases output anywhere from two to five or 10 times in periods of one or at the outside two years is just another phase of taking up the slack.

The previous paragraph does not infer that machine tool development has reached the limit but that further

improvement of production rate and quality of output will be obtained by greater weight and refinement and that the cost of engineering and development will be higher. All of which means that the time-honored trick of cutting car prices and then making the profit out of the machine shop ultimately is going to run against a snag.

Improved production equipment serves one of two purposes or a combination of the two: (1) Either the unit labor cost is reduced for a given standard of quality, or (2) the quality is improved at the same unit labor cost, or (3) by combining these, quality is improved at a lower labor charge. The third arrangement has been the most prevalent in the expansion program of the past few years.

At this point, direct labor cost and overhead enter into the picture. And this picture becomes almost a cartoon when we think of production men calculating unit cost in hundredths of a cent, specifying equipment wholesale and then throwing it out again for new to reduce the price by a fraction of a cent and then adding overhead figuratively by the dollar to the few paltry pennies' direct labor charge. How many manufacturers have sat down and

been honest with themselves on this direct labor cost? By this is meant the direct labor charge as it is understood in these days of 4 to 5 million production figures.

While direct or productive labor charges have been crawling down by these fractional steps, overhead has been running hogwild in the other direction. Give a few expert accountants a half chance and everything in the decalogue is hidden under the all-including name of overhead. This is one of the reasons why operation costs over a specified period never agree with a budget based on hundredth-cent figures. With two or possibly three exceptions in this country, any manufacturer who is spending more than 3 to 6 per cent at the outside of his list price for direct labor, should look over his fences.

In about nine cases out of 10, a reduction of the direct labor charge is accompanied by an increase in the overhead rate. This is simply because the first term has been restricted by a desire to headline production economies while the kick-back loses its sting in the vagaries and generalities of the second term. Direct labor is the smallest item that goes into the makeup of the list price of the present automotive vehicle while overhead strolls all over most balance sheets, taking a slice here and another there until often only the bare skeleton is left.



While direct or productive labor charges have been crawling down by fractional steps, overhead has been running hogwild in the other direction. In most cases a reduction of the direct labor charge is accompanied by an increase in the overhead rate. So many expenses and losses are sometimes hidden in the overhead that the executive who has the temerity to bring the item out in the light and look it over from close range is apt to get a bad shock

If, in the plant of today, the pay envelope of the operator who runs the El Producto-Glutton-Matic is direct labor, why is the wage of the fellow who hauls away his chips overhead? And how about the fellow who unloaded the castings out of the cars, the rough inspector, the truckers who bring the castings to the machine and then move them along again? Also the boss who keeps the operator's nose on the grindstone and the fellow who inspects the work and the other high-priced fellow who nurses this "matic" into some sort of steady operation. All of these pay envelopes are buried in the overhead without benefit of clergy. The existing conception of what constitutes overhead is based on the old contract shop of 1900 where there was one boss, a dozen mechanics, two or three apprentices and one sweeper. The boss and the sweeper were the overhead and their burden was offset by the profit on the apprentices.

In any industrial enterprise in which labor is employed extensively, a measure of fixed non-productive expense is involved. Taxes and insurance of various types, maintenance of buildings and land, rental in some cases, depreciation, the cost of engineering and development work are some of the elements of this expense which is legitimate overhead. Every one of these is an expense which relates to the employment of labor and the continuance of an industrial concern. While each is a burden upon the operation of a plant, none is part and parcel with the movement and fabrication of the product.

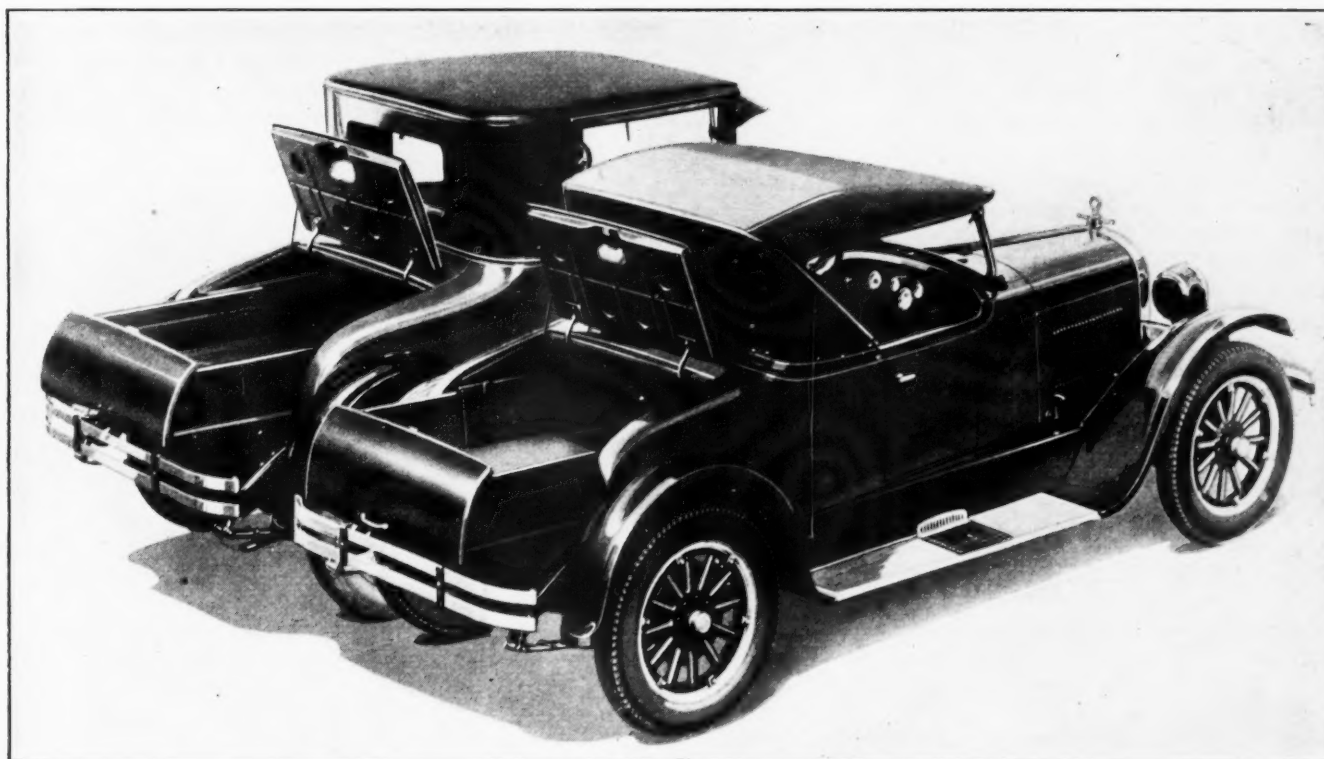
It seems logical that any labor expense which is in-

volved in making the transition between incoming raw material or parts and outgoing finished product is a direct charge. Much of this effort is not direct process labor but is in the nature of service work. Also it seems logical to include service for the mechanical help, meaning machines and equipment, as well as the service which is given actual machine operatives. In the end, all of the various so-called overhead or non-productive operations around a plant are only service work which facilitates the efforts of the actual process operators. As such, these operations are a specific part of the production program and for purposes of measuring the relative cost of the plant's operation per unit of product, should be charged in the direct labor account.

Various departmental group payment plans which are in effect in many shops today are definite steps in this direction and indicate that an appreciation of this idea, whether crystallized or not, is growing—and for sound reasons.

This is not an attempt to rock the foundations of modern accounting because the average accountant's regard for the principles of his Scotch preceptor are adamant and unchangeable. But as applied to the operation of plant and the fulfillment of anticipated financial programs, they don't mean much. What industry as a whole needs is a little less fancy accounting and more well-founded engineering analysis which associates production cause and effect. About the only good reason for present methods of figuring overhead is that the pricing of repair parts is simplified.

Dodge Combination Passenger and Commercial Cars



ANNOUNCEMENT has been made by Dodge Brothers, Inc., that both the standard coupe and roadster models can now be purchased with a sliding drawer, permitting adaptation for commercial uses, at an extra cost of \$100. The telescoping drawer, which is made of steel with electrically welded joints, is built into the rear and is adjustable to three locking positions. When not in use it is left closed, with the hinged rear compartment top down, which gives the appearance of the standard coupe or roadster. When the sliding drawer is provided the tire carrier is mounted on the left running board, forward of the door

New Continental Engines Designed Especially for Buses

Counterbalanced crankshaft, aluminum alloy pistons, oil filters and nickel iron cylinder heads and blocks among features which distinguish the three models in the line.

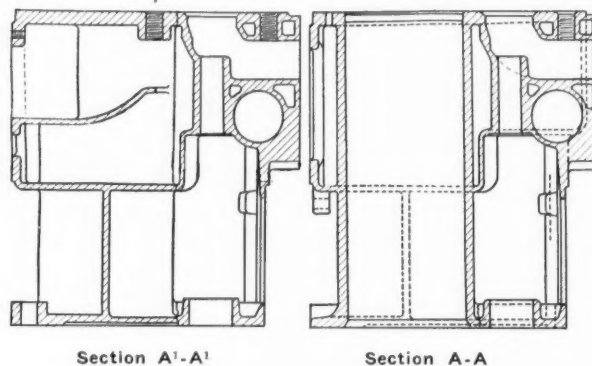
A NEW line of engines designed specifically for bus use is being placed on the market by Continental Motors Corp. of Detroit. These engines, known as models 15H, 8T and 16T, in their general design are very similar to engines 14H, 7T and 14T, respectively, dimensional data being identical; but they embody such features as a counterbalanced crankshaft, aluminum alloy pistons, oil filters and nickel iron cylinder heads and blocks, which were adopted to make the engines suitable for the hardest kind of service.

Each counterweight is secured to its corresponding crank cheek by means of three $\frac{1}{2}$ -in. screws. These counterweights are forgings of S.A.E. No. 1020 steel. By the use of counterweights the effective bearing loads and the wear on

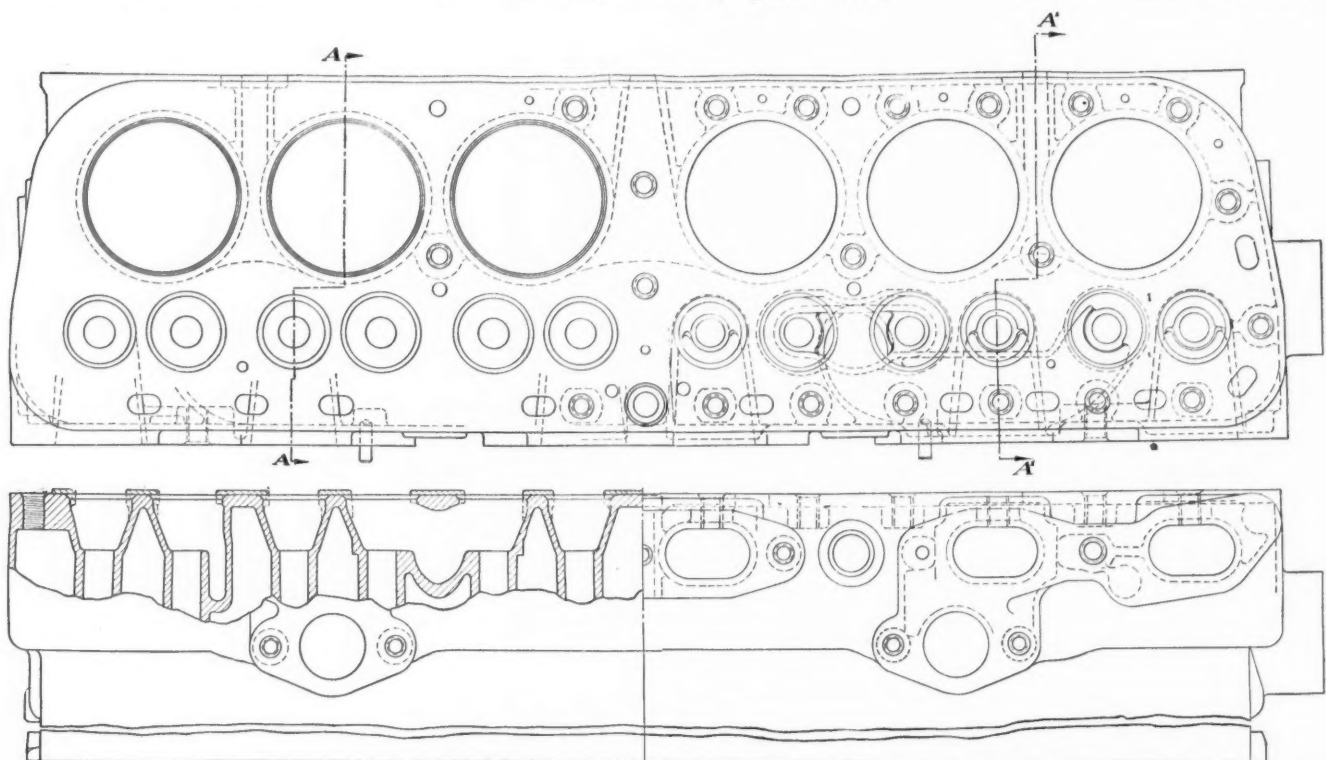
the bearings are materially decreased. The crankshafts themselves are forged from alloy steel and have seven main bearings. No changes have been made in connecting rod design but Nelson type pistons have been adopted as standard.

Both cylinder blocks and heads are now cast of nickel alloy iron, the head embodying a dome type of construction allowing the use of dual ignition when desired. Provision for two spark plugs is made in all cylinder heads. One of the features of design in the cylinder blocks is the use of a baffle in the water jacket which produces a cored passage directing the cooling water at the exhaust valve stem guides and seats.

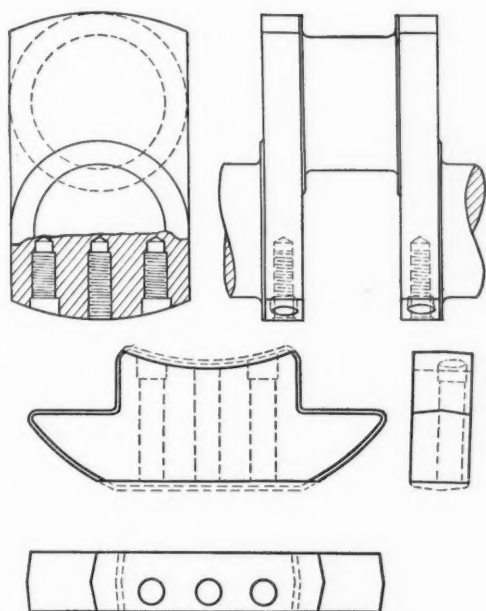
Valves themselves are somewhat different in construction, embodying a tap-



Two transverse sections of cylinder block



Plan view and side elevation of cylinder block



Detail of Continental crankshaft and counterweight

ered retainer lock ring groove instead of the straight groove used in the 14H, 7T and 14T engines, to minimize the danger of valve stem breakage. Exhaust manifolds are now fastened to the blocks by means of crabs at the ends, to reduce the risk of cracking in heavy service. Front end timing gears are now made of $3\frac{1}{2}$ per cent nickel iron, which is harder and wears better than the ordinary iron.

For the sake of greater rigidity, the flywheel housings are now made of cast iron instead of aluminum. The air compressor, of 3 cu. ft. capacity, is now mounted on trunnions instead of on brackets, which give it a more secure support and allow for better alignment.

A Hall-Winslow oil filter has been adopted as standard on these engines, as well as a new design of water pump, incorporating a longer rear bushing fitted with an outside packing nut. The impeller and driving flange of the pump are pressed on, and large capacity grease cups are provided on both bearings.

Helix Angle of 32-35 Deg. Best for Twist Drills

THE second of a series of investigations on twist drills made at the Engineering Experiment Station of the University of Illinois is reported in Bulletin No. 159 of the Experiment Station, published by the University of Illinois, Urbana. The authors are Bruce W. Benedict and Albert E. Hershey. Results of the initial investigation were published in Bulletin No. 103 published in 1917.

This research work has been supported by a number of industrial concerns and acknowledgment is made in the Bulletin to the Central Steel Co., Massillon, O.; the Fulton Co., Nashville, Tenn.; the Detroit Twist Drill Co., Detroit, Mich., and the New Departure Manufacturing Co. of Bristol, Conn.

The initial investigation was largely preliminary in scope and it was decided in the second series to make a comprehensive study of the relation of the helix angle of twist drills to the power consumption and endurance, in both gray cast iron and steel, with the object of determining what helix angle best satis-

fies the inseparable requirements of (a) economy in the use of power and (b) resistance of the cutting edge to wear and destruction.

As a result of this second investigation the following general conclusions are drawn by the authors:

(1) Power consumption at the drill point in drilling gray cast iron or steel decreases as the helix angle is increased from 15 to 45 deg., the amount of power consumed being lowest in drills with helix angles of 45 deg.

(2) Saving in power consumption at the drill point resulting from the use of the larger helix angles varies with the machineability of the metal and with the drilling rate. This saving at large feeds in steels of high machineability will exceed 30.0 per cent, in steels of low machineability 8.0 per cent, and in gray cast iron, 25.0 per cent. At lower drilling rates the saving is approximately proportional to the rate of feed.

(3) The torque on the drill and the thrust on the end of the drill decrease progressively as the helix angle is increased from 15 to 45 deg., and both are at a minimum in drills with helix angles of 45 deg.

(4) Possible reductions in the torque on the drill by increasing the helix angle from 26 to 45 deg., at large but practicable drilling rates, will exceed 20.0 per cent in gray cast iron, 8.0 per cent in steel of low machineability, and 30.0 per cent in steel of high machineability.

(5) Possible reductions in the thrust on the end of the drill by increasing the helix angle from 26 to 45 deg., at large but practicable drilling rates, will exceed 21.0 per cent in gray cast iron, 28.0 per cent in steel of low machineability, and 41.0 per cent in steel of high machineability.

(6) Drill endurance in drilling gray cast iron or steel is not materially affected by changes in helix angle from 26 to 45 deg. inclusive, when drilling at normal rates in metals of uniform structure. In certain carbon and alloy steels, at high drilling rates, the endurance of drills with helix angles above 35 deg. and below 28 deg. is less than that of drills with helix angles between these limits. The factor of endurance is governed more by the character of the materials drilled and the conditions of drilling than by the size of the helix angle.

(7) Considering the principal factors affecting drill design, power consumption at the drill point, and endurance of the cutting edge, drills with helix angles from 32 to 35 deg. give the most satisfactory performance in gray cast iron and steel. Drills with these helix angles are equally efficient in gray cast iron and steel.

(8) There is no apparent justification for reducing the helix angle from point to shank for the purpose of increasing chip space. Chip ejection from deep holes by drills so constructed is not better than by drills with constant helix angles.

(9) A web thickness of 0.10 in., uniform from point to shank, proved adequate in this test for 1-in. high speed drills having helix angles above 32 deg. For drills of lesser helix angles this web thickness does not give the requisite torsional strength for drilling at high rates of feed in steel.

(10) Drill torque may be taken to be an accurate measure of the machineability of metals. Apparently machineability is a factor which depends upon the combined effect of the hardness and plasticity characteristics of metals, and consequently it is not correctly measured by the Brinell number.

Standard Spindle Nose is Adopted by Milling Machine Industry

Standards for milling machine arbors and accessory fittings also announced. Estimated that 15 new arbors will replace between 250 and 300 now used. Means reduction in inventory.

AN important step forward in machine tool standardization is denoted by the announcement of a standard spindle nose construction by nine principal manufacturers of milling machines. Simultaneously, standards for milling machine arbors and accessory fittings are announced, and it is estimated that the 15 new arbors will replace between 250 and 300 now supplied by these manufacturers. The new standard arbors can be used in all milling machines from No. 1 to No. 5 and cover power requirements ranging from 2 to 25 hp.

Obvious advantages of this wide interchangeability are a great reduction in inventory and flexibility of application, and the standard has the further merit that it does not scrap a single arbor now in service. This is due to the fact that, although the new spindle nose standard goes into effect immediately, users will be able to obtain from the milling machine manufacturers a variety of special collets which fit the new spindle nose and accommodate existing arbors.

The new standard is sponsored by the milling machine group of the National Machine Tool Builders' Association; it is not identified with any particular plant but represents the best thoughts of the industry. One advantage claimed for it is that it incorporates the dimensions now in wide use for mounting face milling cutters. Shopmen will appreciate the fact that the taper of the arbor has been increased and thus the sticking tendency, which has been

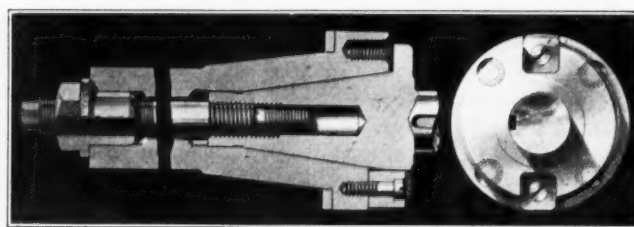


Fig. 1. Sectional view of typical spindle equipped with standard spindle nose, showing draw-in arbor bolt, large taper and key-driven arbor

characteristic of all milling machine arbors in the past, has been eliminated.

A heavy draw rod holds the cutters securely in the working position and in conjunction with a pilot which guides the arbors and collets, insures easy mounting and dismounting by one man.

It must be understood that the standard applies only to the nose portion of the spindle and that otherwise the spindles are not interchangeable. Pendant or outboard bushings also have been standardized. The nine companies which are putting the new standard into effect immediately are: Brown & Sharpe Mfg. Co.; Cincinnati Milling Machine Co.; the Hendey Machine Co.; Kearney & Trecker Corp.; the Kempsmith Manufacturing Co.; R. K. LeBlond Machine Tool Co.; the Oesterlein Machine Co.; Reed-Prentice Machine Co.; Sundstrand Machine Tool Co.

Fig. 1 shows the two ends of a typical milling machine spindle and the arbor and draw-in bolt in place. In all cases the hole at the spindle nose face is of $2\frac{3}{4}$ in. diameter and the taper is $3\frac{1}{2}$ in. per ft. Square hardened driving keys and four tapped holes for the mounting of face mills are standard. With this large diameter, heavy arbors can be used where desired and can be driven by the keys engaging with notches in a flange. Fig. 2 shows the essential dimensions of the standard spindle nose and arbor, and a number of adapters for existing arbors and cutters.

Fig. 3 shows several features, including the mounting of heavy face mills, arbor bearings, the

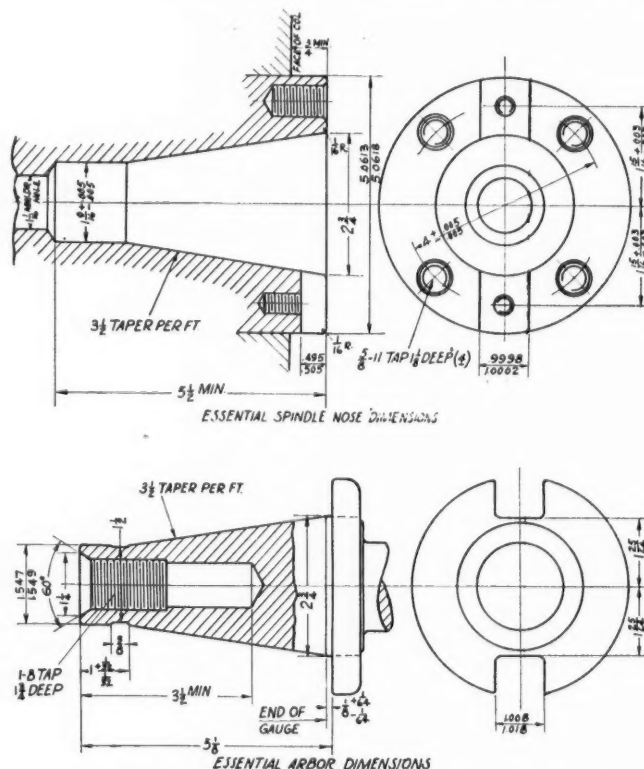
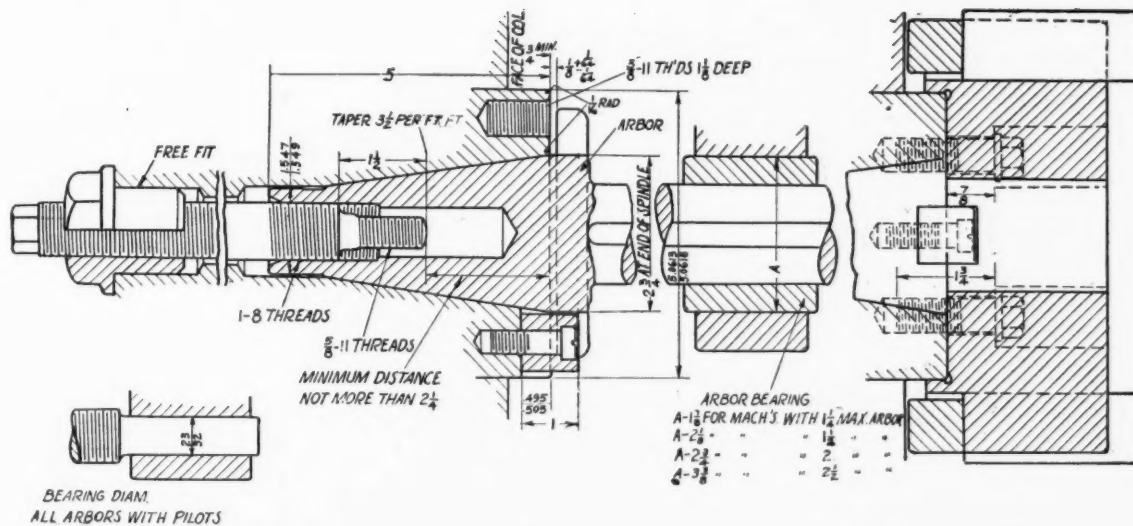


Fig. 2. Standard spindle nose and arbor shank, and three adapters for various tapers now in use, showing essential dimensions



standard arbor pilot and an arbor in place with the draw-in bolt. A typical collet adapter for existing arbors and cutters is shown by Fig. 4 while a layout of arbors for national standardized shell end mills is shown in Fig. 5.

As shown, the draw-in rod is free of torsional strains, as the arbor is drawn up tight, after being piloted by the taper, by the 1 in. thread at the rear end. The small thread at the front end of the draw-in rod is utilized when special collet adapters are used with equipment already in service. Fig. 2 shows some typical examples.

Master gages for the spindle ends, arbor mounting details and special collets were made in the shops of Brown & Sharpe. Owing to the combination of the pilot at the small end of the taper and the notched flange which fits into the driving keys, the arbor remains in place safely while the set-up man or operator goes around to the back of the machine to tighten up the draw-in bolt. The change in the taper eliminates the difficulty which has been associated with tear-downs and cutter changes, and also the necessity for driving the arbor out every two or three days when the machine is in steady operation.

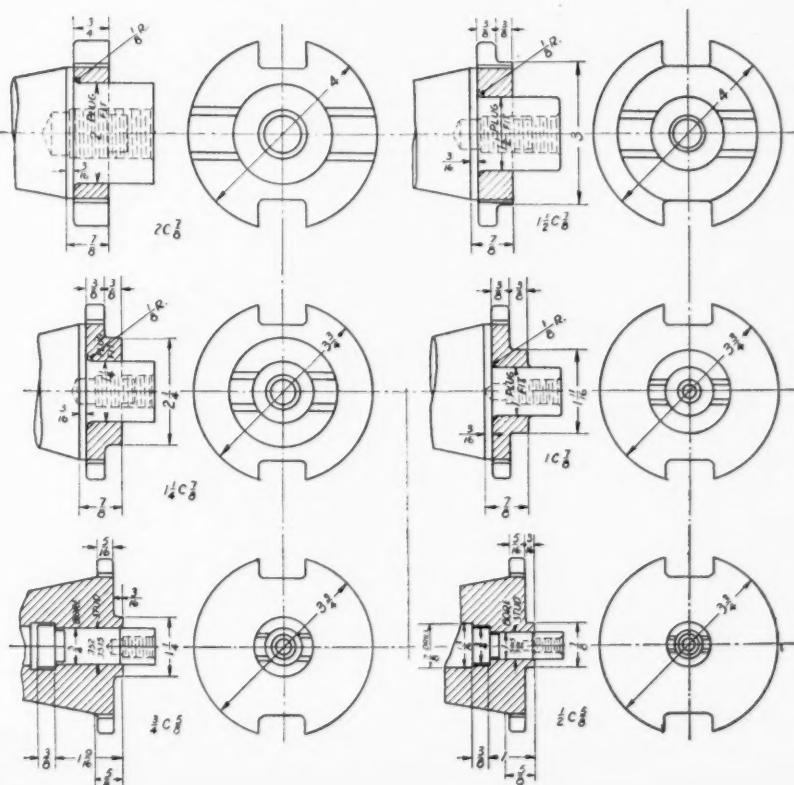
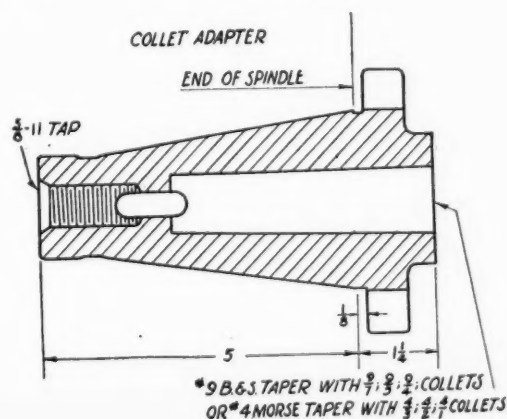
The advantages of this new standard-

ized spindle end are as follows:

1. Complete interchangeability of all arbors and face milling cutters for any size or make of milling machine from 2 to 25 hp. capacity.
2. Reduction in cost of equipment due to simplification and elimination of the countless sizes and variety of milling arbors and cutters now in use.
3. New steep angle taper (3 1/2 in. per ft.) insures instant release of arbor. The arbor cannot "stick" in the spindle.
4. Inner end of spindle hole is bored straight for arbor pilot, thereby keeping the arbor in place while inserting or removing the draw-in arbor bolt.
5. The steep taper with its large diameter bore at the outer end of spindle allows the use of stronger arbors, particularly where cutters must be extended.
6. Large diameter draw-in arbor bolt can be tightened under heavy pressure to firmly hold arbor in taper.
7. Front end of arbor draw-in bolt is provided with

Fig. 5, Right: Layout of arbors (Style C) for national standardized shell end mills

Fig. 4, Below: Typical adapter for existing arbors



an extension threaded end for holding auxiliary equipment.

8. A complete set of new arbors has been adopted, standardized as to diameter, length, keyway and numbering.

Style A, Teated Arbors

The standard teat or pilot is to be 23/32 in. (0.7180-0.7185) in diameter and 1½ in. long. Five sizes standardized are as follows:

7/8 in. Dia.	10 in. Long, shoulder to nut
1 " "	12 " " " "
*1 " "	18 " " " "
1¼ " "	12 " " " "
*1¼ " "	18 " " " "

Style B, Plain Arbors

Ten sizes standardized are as follows:

1 in. Dia.	24 in. Long, shoulder to nut
1¼ " "	24 " " " "
1½ " "	18 " " " "
1½ " "	24 " " " "
1½ " "	30 " " " "
1½ " "	36 " " " "
2 " "	30 " " " "
2 " "	36 " " " "
2½ " "	30 " " " "
2½ " "	36 " " " "

The threads for all arbor nuts are to be 10 per inch, U. S. Form, Class 2 Fit.

The above arbors are to be furnished with two bearings, bearing diameters to be selected by the customer to suit machine.

All Style A and Style B arbors are to have the new standard keyways tentatively adopted by the cutter manufacturers and now in process of standardization by the Milling Cutter Committee under American Engineering Standards Committee procedure.

Arbors for shell end mills shall conform to the standard shell end mills now in process of standardization by the Milling Cutter Committee under American Engineering Standards Committee procedure. See Fig. 5 for details.

Arbor Nomenclature

A standardized nomenclature or numbering was adopted for the new standard arbors. The three types of arbors were designated: Teated type—Style A; bearing or plain type—Style B, and shell end mill type—Style C.

The bearing sizes are designated thus:

- 1⅞ in. dia. No. 3 (For arbors up to and including 1¼ in. dia.)
- 2½ in. dia. No. 4 (For arbors up to and including 1½ in. dia.)
- 2¾ in. dia. No. 5 (For arbors up to and including 2 in. dia.)
- 3 in. dia. No. 6 (For arbors up to and including 2½ in. dia.)

The arbor symbol is made up of the arbor diameter, style, arbor length (shoulder to nut) and the bearing number, thus:

1A 12=teated arbor 1 in. dia. 12 in. long.

1¼ A 18-4=teated arbor 1¼ in. dia. 18 in. long with bearing 2⅞ in. dia.

1½ B 30-5=plain arbor 1½ in. dia. 30 in. long with bearings of 2¾ in. dia.

For metric arbors the symbol is preceded by the letter "M" and the diameter is given in millimeters, thus:

M25B 30-4=metric arbor 25 m/m dia. Style B, 30 in. long with bearings of 2⅞ in. dia.

Shell end mill or Style C arbors made to accommodate the proposed new standard shell end mills have two variables, the diameter and the distance from the face

of the spindle to the back of the cutter. These two variables enter into the symbol, thus:

1½ C ⅞=shell end mill arbor 1½ in. dia. with a projection of ⅞ in. from the end of the spindle to the back of the end mills.

While it is expected that standard shell end mill arbors of any one diameter will be kept in stock with only one distance from the end of the spindle to the back of the cutter, as shown in Fig. 5, the symbol allows special arbors to be ordered without confusion.

It may be desirable for some manufacturers to carry other lengths in stock, such as short stub arbors for vertical machines, while other manufacturers will not care to carry all sizes in stock. The numbering system therefore has been made flexible enough to allow for its use on sizes other than standard, thus:

1½ B 3½=plain arbor 1½ in. diam., 3½ in. long shoulder to nut, with no bearings.

Timken-Detroit Trolley Axles

CONSIDERABLE interest has followed a report that the Timken-Detroit Axle Co., is to enter the electric railway field. The report was based upon the fact that a few axles and trucks were built for this class of service.

A recent bulletin from the company states that it is not planning to build complete trucks for electric railway cars and that all its work along this line has been entirely experimental. Two complete trucks equipped with worm drive axles have been built in the Timken shops for the Chicago & Joliet Electric Railway and four worm drive axles have been built for the Springfield Street Railway to be installed in trucks being built by J. G. Brill Co., but it is emphasized in the official statement that all this work is experimental.

The axles employed are not much different from those used in the automotive field. The worm drive is of fixed hub construction. The housing is a one-piece steel construction with the worm carrier bowl offset to accommodate offset motors. The spring seat is cast integral for a 4 in. spring. Comparing the axle shaft with a conventional automotive shaft, it is seen that the spline end is quite small in relation to the load end, which is so designed because of the small amount of power required to slip the wheels on the rail.

The wheel bearings are double opposed Timken tapered roller bearings. The worm carrier assembly is removable by taking out the axle shafts. The worm shaft is mounted on two taper roller bearings at the rear and an annular roller bearing at the front. Brakes are of the cast shoe type with removable liners operated by Westinghouse diaphragms. The use of worm gear construction permits a lower job as the motors can be mounted on the truck frame. They can be reduced in size also because of the available worm gearing ratios.

BULLETIN No. 243 of the U. S. Bureau of Mines, Department of Commerce, deals with Diamond Drilling with Special Reference to Oil-Field Prospecting and Development, the author being Frank A. Edson. The diamond drill has proved its worth in prospecting for coal and ores, and may fill the need for better prospecting methods in the oil industry, although its use in the oil fields is recent. In northern Oklahoma the diamond drill is now being used for determining geologic structures as well as for testing for oil production. Several oil wells in Mexico and test wells in a number of states have been sunk with this drill. The bulletin forms a comprehensive treatise of 170 pages with numerous illustrations.

*—These arbors to also have long bearing for arbor pendant.

Just Among Ourselves

Study of Street Traffic in Chicago

NO more interesting summary about practical traffic matters has reached us for a long while than the results of traffic studies made in Chicago by the Albert Russel Erskine Bureau for Street Traffic Research. More than half the pedestrians held up by movement of cross traffic attempt to break through the traffic stream against signal lights, the Bureau found, but only about one-third are successful in reaching the opposite curb; the rest are caught between lines of moving traffic in the center of the roadway, endangering themselves and materially reducing the speed and volume of traffic flowing through the intersection. The whole study simply serves to emphasize more strongly than ever the extremely serious retardation of the speed and volume of traffic movement brought about by the refusal of the pedestrian to stop and start in accordance with traffic light signals at intersections.

* * *

Recommends Penalties for Jay-Walking

THE report recommends among other things that jay-walking be prohibited with suitable penalties for violation. While the speed of traffic would be materially aided by the elimination of the middle-of-the-block crosser, it does seem as though the greatest elimination of waste time could be made by regulations to force the pedestrian to observe traffic light signals just as motorists do at intersections and perhaps by having the laws so adjusted that the pedestrian crossing in violation of traffic lights would do

so entirely at his own risk. That some such provisions would benefit the pedestrian is indicated by the detailed results of the study mentioned which show that "the pedestrian who ignores traffic signals and rushes across street intersections without their protection has less than one chance in three of reaching the other curb without wasting more time than he saves." Pedestrian regulation has benefitted conditions materially in the several places where it has been tried intelligently and would seem to offer good possibilities for further application.

* * *

The Proposed Perpetual License Plate Law

A PERPETUAL license plate law, which would do away with the issuance of a new license plate for each car each year, is being introduced in the Michigan Legislature. It is looked on with favor by the Michigan Automotive Trade Association, the Michigan State Farm Bureau and various units of the Grange. The idea would be to have a 4c instead of a 2c gas tax to make up the revenue to the state, the saving to come in the reduced cost of handling and issuing of plates and in the actual cost of the plates themselves. It is understood that at least one of the bills on this subject will provide ways and means of keeping proper identification of vehicles using perpetual plates. If this can be taken care of, one of the strongest objections to the perpetual plate system will have been overcome. Elimination of the great furor caused the end of each year with thousands of motorists scrambling for new plates at the last moment, is

one of the arguments most advanced by advocates of the perpetual plate law. In many ways that argument is sound, yet it should be remembered that this same furor is not a necessity even under the yearly plate system. In several states, Pennsylvania for one, the owner receives a card several months before the end of the year, signs it and sends in his check, receiving by mail in a few days his new plates. While the state administrative detail still is large, the convenience of the owner could scarcely be made greater under any system.

* * *

Success Will Depend on Working Out of Details

UNDER a perpetual plate system it would seem desirable also to have some means of knowing when the car for which a given set of plates was issued goes out of existence, thus obsoleting the plates. Details of improving the physical wearing qualities of the plates themselves also would have to be taken care of, while it would seem likely that the state officials would want to have some means of knowing approximately the number of vehicles in operation during a given year so that they might properly base their estimates of returns from the gasoline tax during coming fiscal periods. There is much to be said both for and against a perpetual plate law and it is our opinion that the details of a particular law will determine whether or not it is desirable from the standpoint of both the state and the owner. The details will be just as much worth arguing about as the principles in this case.—N. G. S.

New "Twin Coach" Has Two Engines Mounted Under Floor

Latest Fageol creation looks like small street car and is designed to increase seating capacity. Weight also reduced by combining body and chassis. Drive to each rear wheel.

By P. M. Heldt

FRANK R. FAGEOL of Oakland, Cal., originator of the Fageol Safety Coach, has recently developed an entirely new coach type. In this design Mr. Fageol's main idea has been to more fully

utilize as seating space the area represented by the overall length and width of the coach. In the conventional design, with an engine under a bonnet in front, a considerable proportion of this area is lost for seating purposes.

The new design, known as the "Twin Coach," has two independent powerplants, each in driving connection with one of the rear wheels. Every effort has been made in the design to reduce weight. The total load is equally divided between the front and rear axles and the wheelbase is short for a single decker with a seating capacity of 42. Owing to the short span between axles the bending moments on the longitudinal supporting members are reduced, and these members, therefore, need not be so heavy.

Another expedient aiming at weight reduction consists in combining the chassis and body in one. There are two longitudinal frame members which are supported on the front and rear axles through semi-elliptic springs. These members consist of 6 in., 8 lb. structural channels, and they run parallel with each other for the greater part of the length of the coach, to points beyond the outer spring connections. At the very ends these channels are splayed outwardly, to make room between them for a spare tire at each end. On top of these longitudinal members there are cross members consisting of double 2½ by 2½ in. channels, one above the other, which form the floor supports.



Front view of Fageol twin coach



Three-quarter view of the coach. Note louvered covers over engine space in center

The side posts of the body consist of 1¼-in. T irons bent to the curve of the domed roof. They join at the bottom to angle irons running the length of the body. At the top they do not extend clear across, the center section of the roof, 42 in. wide, being made of ply-metal ⅜ in. thick, without a framework for a backing. The posts extend up to this center section and are covered by 18-gage steel on the outside and by sheet aluminum on the inside, the steel outside sheeting on both sides and roof overlapping and being riveted to the posts. The floor is made of ¾ in. laminated wood, in four sections, and is covered with battleship linoleum.

The coach has an overall length of 31 ft. 6 in., an overall width of 7 ft. 10 in., and a height of 8 ft. 4 in., the headroom being 6 ft. 4 in. The road clearance is a minimum about midway between axles, where it is 12 in., while at the ends it is 14 in. The wheelbase is 203 in., the track 78 in., and the body overhangs both the front and the rear axles 6½ ft. (87½ in. if the extreme points are considered). The floor is only 25 in. from the ground, which facilitates loading and unloading. The coach weighs 14,350 lb.

Special Six-Cylinder Engine

A six-cylinder engine is being specially designed for the job of 3½ by 4½ in. cylinder dimensions. This engine, being of the L-head type and of comparatively short stroke, will be of low height, so it will go readily under the side seats and can be slipped out of the coach sideways. It will be made in "rights" and "lefts," that is, one engine will have the valves on the right hand, the other on the left hand side, so that all valves will be on the outside and readily accessible for inspection. Three-point trunnion support is used for the engines, and all supports are "rubber-insulated."

Each engine is combined with a multiple disk clutch and a conventional three-speed-and-reverse transmission into a unit powerplant, from which the drive is taken through a tubular propeller shaft with two Spicer universal joints to a worm drive connected with each rear wheel.

Special interest to the method of control of the two powerplants from the driver's seat in the extreme front of the coach. Each of the two throttle valves is connected by a linkage to an accelerator pedal with a pad of about one-half the normal width. These two

pedals are located close together, side by side, and the driver moves both equally, thus opening and closing the throttles of the two engines in unison, though he can control each one separately by "twisting" his foot. There is a cross shaft between the two throttles and the connections between this cross shaft and the throttle arms are individually adjustable, for purposes of synchronization.

Control of the two clutches is similar to that of the throttles. That is, there is a cross shaft from which adjustable connections are made to the clutch shifter levers, and this cross shaft has a lever and link connection to the clutch pedal. In the case of gearshift control the problem is somewhat more complicated, since a compound motion must be transmitted. The gearshift lever at the driver's seat connects with a tubular sliding shaft supported in a tubular guide. This sliding shaft can be rocked around its axis by the shift lever for the purpose of picking up one or the other of the two shifter bars, and it can be shifted in the direction of its axis to engage one or the other of the two gears controlled by one shifter bar. The



Rear view of the twin coach, showing curved corner window glasses



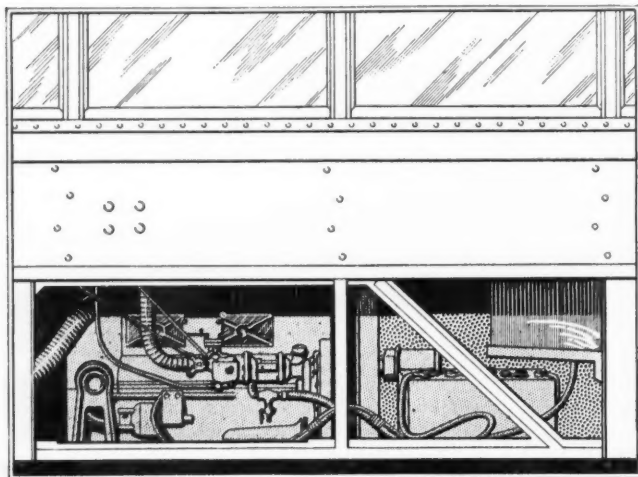
Interior view taken from the front. Note longitudinal arrangement of the two middle seats



This picture of the interior is taken from the rear and shows unbroken view through front windows

sliding shaft at its rear end carries an upwardly extending arm, which engages with a downwardly extending arm on a sliding cross shaft by means of a universal joint. Rocking the longitudinal sliding shaft around its axis will cause the cross shaft to slide in the direction of its axis, dropping one and picking up the other of the two shifter bars. Then, sliding the longitudinal shaft in the direction of its axis will cause the cross shaft to rock around its axis and move the shifter bar picked up to one extreme or the other of its range of motion.

In addition to being accessible from the outside, the two engines are accessible also from the inside of the coach. It is preferable, of course, to arrange them so that most of the work required on them can be done



Sketch showing accessibility of engine and accessories from the outside

from the outside, as this eliminates possible disturbance of passengers. To get at the inner side, the cushion of the longitudinal seat over each engine is taken off, and then the seat board and the kneeboard, which are formed in one, are swung around hinges at the bottom of the kneeboard to completely uncover the engine.

An interesting arrangement of the engine cooling system is another feature of design. In the side view of the coach will be noticed two removable plates with louvres in them, about midway between the front and rear wheels. The rear one of these closes the engine space, while the front one covers a space in front of the engine in which are located the generator, air compressor and storage battery. Generator and air compressor are driven directly from the engine crankshaft through a flexible coupling. The core of the radiator forms the partition between these two compartments, and is formed with a hole in it through which the crankshaft extends. The larger part of the air drawn through the radiator by the fan is taken from outside through the louvres in the forward cover plate, while a certain proportion of it is taken from the inside of the coach, through an opening under the longitudinal seat, which produces a ventilating effect and keeps the air within the coach free from any engine fumes, etc.

Each engine is provided with its own electric starter and battery, in addition to having its own generator and air compressor.

Fuel is carried in a 50 gal. tank carried beneath the floor at the middle of the coach, and suspended from the main frame bars.

Not much needs to be said with regard to the front axle, which is a Timken axle of heavy type. The rear axle, however, is of special design. It comprises a central carrying member in the form of a 3-in. tube of nickel steel with a $\frac{3}{4}$ in. wall. This member is located below the wheel axis, thus forming a drop axle. At both ends it carries castings which form the spring perches, bearing housings, worm wheel drive housings and brake supports. From the worm wheel a shaft extends through this axle member and at its outer end connects with the drive wheel. Owing to the use of two powerplants there is no need for a differential.

All springs are of the semi-elliptic type, of chrome-vanadium steel, 60 in. long by 4 in. wide, and have a camber of 2 in. A special type of spring damper is used, consisting of metal plates on top and below the spring, with a rubber pad between the lower plate and the spring leaves, the metal plates being drawn together by steel bolts and nuts. The spring leaves are thus pressed together under elastic pressure (due to the presence of the rubber pad) and the interleaf friction is greatly augmented. Shackle bolts are $1\frac{1}{2}$ in. in diameter by 4 in. long and are automatically oiled by means of the Myers magazine system.

The coach, which is being demonstrated in the East, has a rear axle reduction of 5 to 1, and this is intended as the standard reduction for mechanically driven coaches. It is planned to also turn out a coach of this type with electric drive, in the case of which the rear axle reduction will be 11 to 1, as electric motors can be run at much higher speeds than reciprocating engines. The Hotchkiss drive is being used.

Westinghouse air-operated, metal-to-metal brakes are fitted on all four wheels. There is an air compressor connected with each engine, and both compressors deliver into a common air tank carried under the body. The brakes are of the diaphragm type and diaphragm chambers are located adjacent to the brakes on all four wheels. In addition to the four-wheel air brakes there is a driveshaft brake on each driveshaft. These driveshaft brakes are operated by the emergency brake lever in the usual way.

The steering gear is of the Ross worm and sector type. Ignition advance being automatic and throttle control being by accelerator pedal only, there are no control levers on the steering wheel. From the steering arm the drag link extends back to the left steering knuckle. Disk wheels of the Budd-Michelin type are used and are fitted with 35 by 8 in. giant tires in the case of the mechanically driven, and 38 by 9 in. tires in the case of the electrically driven coach.

In general appearance the coach is not unlike the Birney one-man street car. It is symmetrical at both ends and is provided with four doors, two for entrance ahead of the front wheels, and two for exit behind the rear wheels. These doors are of the folding-in type and are operated by compressed air from the driver's seat. The height of the entrance platform from the ground is only 14 in.

If the coach is intended for long distance service, 40 passengers can be accommodated, while for urban service seating accommodations for 42 can be provided. In the latter service, moreover, there is room for 35 standees, making the total capacity 77. Seats are either of the de luxe street car type or of the parlor car type with de luxe upholstery. Most of the seats are cross-wise, with a center aisle between them, but there are longitudinal seats over the front and rear wheels and over the powerplants. At the rear there is a wide lounge-type seat accommodating six passengers.

Cast Iron More Resistant to Wear if Pearlite Content is High

New tests seem to prove that Brinell hardness has no effect on degree of wear. Chemical composition likewise a factor of little importance in this respect. Pure perlitic iron best.

AN investigation of the factors affecting the resistance to wear of cast iron has been made by Dr.-Ing. Otto Heinz Lehmann and a report on it was published in the *Giesserei Zeitung*, of which an abstract appears in *Der Motorwagen*. The subject is of considerable interest to automotive engineers for the reason that practically all engine cylinders are made of cast iron or have cast iron liners, hence the life of engines is dependent upon the resistance of cast iron to wear.

In spite of the great importance of the subject little experimental work seems to have been done on it. C. E. Nussbaum in 1909 let different grades of steel and bronze slide against a hardened steel disk, in a bath of oil, and after 10,000,000 revolutions at a specific pressure of 682 lb. p. sq. in. and a speed of 3200 r.p.m. he determined the thickness of the layer worn off. With rail steel he found no relation between the carbon content and the amount of metal worn off, but there was found to be a relation between the manganese and silicon contents and the amount of wear. E. H. Saniter, who in 1912 devoted attention particularly to rolling friction, found that there is relation between the Brinell hardness and the resistance to wear.

Realizing that only a systematic series of experiments could furnish information concerning these relations, the author of the article under review devoted a long series of tests to the resistance to wear of cast iron. His object was to derive useful values for the influence of the mechanical, chemical and metallographic properties of the material on the resistance to wear.

Experimental Apparatus

The experimental apparatus consisted of a rotating disk, against which the test piece was pressed. The disk was readily interchangeable and had a diameter of 4.4 in. and a width of 1.2 in. Its circumferential speed was 7.5 ft. per second (400 r.p.m.). Each test piece was analyzed, and its Brinell hardness was determined by means of a 10 mm. ball under a pressure of 1000 kg. The mean of four determinations was taken. Changes in weight were determined on an analytic balance. The materials tested consisted largely of brake blocks, but cylinder iron and valve liner iron were also included.

Preliminary tests were required to determine the most favorable loads or surface pressures. Owing to the fact that at the beginning contact was obtained only along a line, theoretically at least, the losses in weight were unusually high. After the test pieces had been worn down to conform to that of the disk the losses became less. For the principal tests the test pieces were ground to form and then cleaned of grease.

Previous to each test the disk also was either turned or ground down.

First of all, the sliding friction of cast iron of from 123 to 185 Brinell hardness against rail steel was investigated. The surface pressure was 113.6 lb. p. sq. in. and the duration of the test two hours. From the results on 14 samples no connection could be established between the Brinell hardness and the resistance to frictional wear; nor was there any apparent relation between the chemical composition and the resistance to wear.

Micrographic Examination

Thereupon the author subjected the test pieces to a careful micrographic examination, determining for each sample the proportion of pearlite to ferrite. If the samples are arranged in order on this basis and the weight losses due to wear are put down in a parallel column, an important conclusion can be drawn from the tabulation. The wear decreases with any increase in the pearlite content. Only two of the samples gave results that seemed contrary to this rule, and in their cases it could be definitely proved that they contained a well-developed phosphite eutectoid, which is abnormally hard, and has an abrasive effect.

The second series of tests served to determine the sliding friction of cast iron of from 113 to 191 Brinell hardness against hard cast iron of 203 Brinell. The conditions under which these tests were run were the same as in the first series. Micrographic examination of polished and etched sections led to the same conclusion as that arrived at in connection with series 1, namely that a sample containing a larger proportion of pearlite is more resistant to wear.

Finally the author investigated the wear conditions of cast iron against very soft cast iron. In this case, too, the samples with large pearlite content stood out favorably, although the results were strongly influenced by the detaching of particles of the soft cast iron.

It seems therefore to have been proved experimentally that the Brinell hardness has no determinable influence on the resistance to wear of cast iron, nor has the chemical composition. On the contrary, the pearlite content, if its effect is not counteracted by a phosphite eutectoid, is of preponderant importance. According to the tests a pure perlitic iron gives the best results.

These tests, of course, relate to wear under dry friction, and while the absolute values determined are of no importance from the automotive point of view, the conclusion with respect to the beneficial effect of a high pearlite content should be equally applicable to irons to be subjected in service to lubricated friction.

New Developments of Interest

Gisholt Static Balancer

FOR balancing flywheels, clutches, automobile wheels, pump impellers and other parts of small axial length, the Gisholt Machine Co. of Madison, Wis., has developed a static balancing machine of which a photograph is reproduced in Fig. 1. The machine indicates both the amount and the location of the correction required in order to place the part being tested in static balance. It is designed as a production tool, and 25 or more pieces can be balanced per hour. To expedite the work of balancing the parts, a drill is combined with the balancing machine. This combined testing machine and drill press requires a floor space of 19 by 33½ in.

In the operation of this machine, the part to be balanced is mounted on an adapter A, Fig. 2. The adapter in turn is mounted on a vertical spindle B, which is carried on a cradle supported on two pivots that allow it to rock in one plane only. In operation, the heavy side of the piece throws the cradle out of level.

The heavy side of the piece is indicated by the spirit level C. Dial D is connected by a "weighing spring" to the cradle. The tilt of the cradle is corrected by turning the dial in the direction indicated on the level, and the amount of rotation necessary to return the bubble of the spirit level to dead center is noted. Slider G, Fig. 3, is then set so that the first reading of the dial is indicated on scale H.

The part being balanced is then turned 90 deg. about its axis, as indicated by the graduations of dial E on the cradle. This changes the location of the unbalance with respect to the pivot axis, and the cradle with the piece is again out of level. The condition of level is again restored, and a second reading is taken on dial D. Protractor scale K is moved until the reading from dial D is uncovered on slider G. Then the correction readings are taken; first, on protractor M, the angular position to which dial E must be set to bring the heavy side of the work under the drill, and second, the depth and number of holes to be drilled, on scale K.

Without handling the piece, the motor-driven spindle is then very easily brought into action to remove the necessary material to bring about static balance. A lever F, Fig. 2, serves to lift and rigidly lock the table to protect the pivots against shocks in loading, unloading and correcting the work.

Several months' use of the machine in production work is said to have shown that it will measure and locate static unbalance to within 0.2 oz.-in. It is also

Machine Tools and

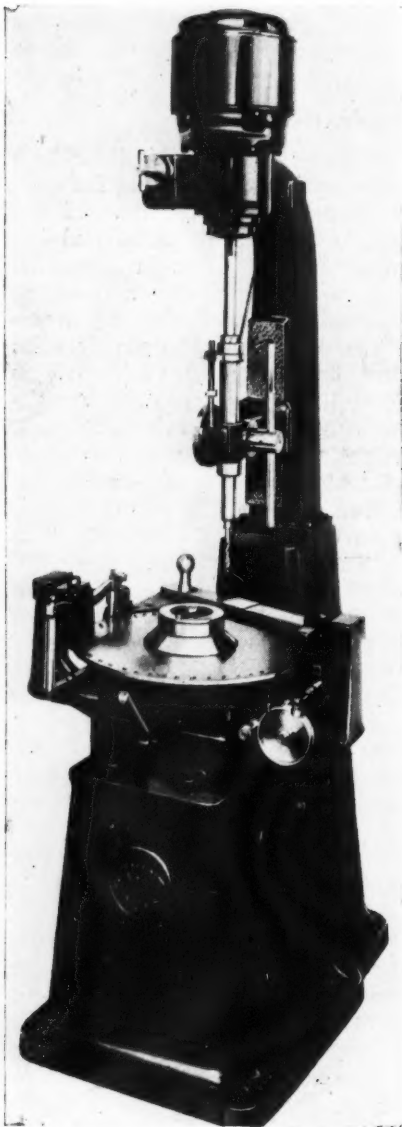


Fig. 1. Gisholt static balancing machine, for flywheels, etc.

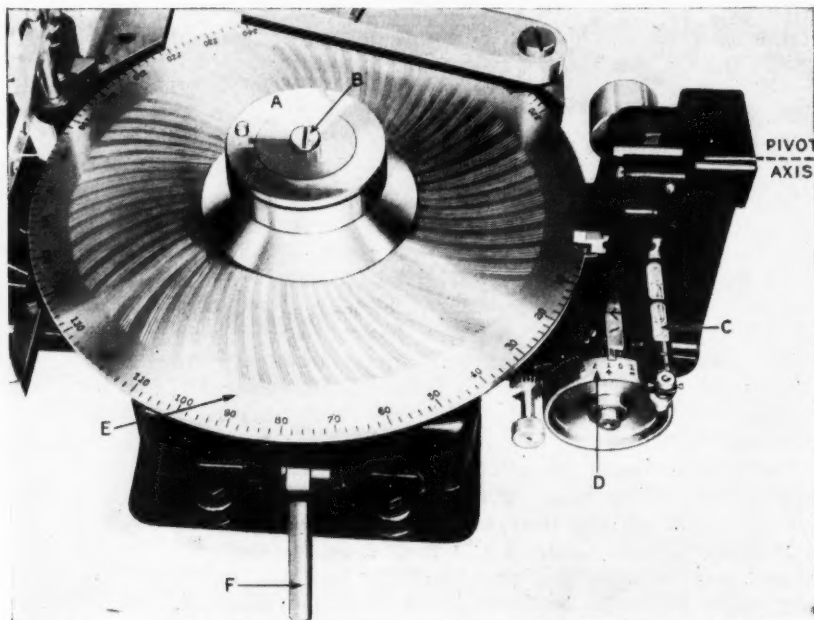


Fig. 2. Close-up view, showing adapter, spirit level and dials

to Automotive Production Men

Other Shop Equipment



of interest to note that the amount of unbalance in narrow parts as indicated by the static balancer checks with the readings obtained by measuring the unbalance of the same parts on the Gisholt precision balancing machine.

The Gisholt static balancer will handle parts of small axial length weighing up to 150 lb. and swinging up to 18 in. in diameter; it can be furnished to accommodate larger work when necessary.

Pratt & Whitney Super-Micrometer

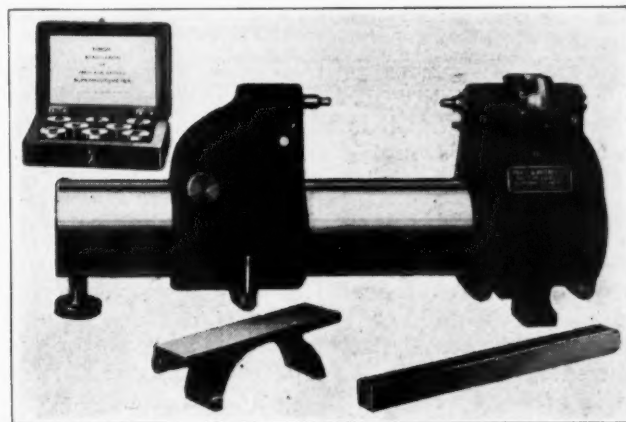
SIX years ago the Pratt & Whitney Co. introduced the Pratt & Whitney super-micrometer. This instrument, which measures to ten-thousandths of an inch, found a ready place in manufacturing. It has now been redesigned to incorporate improvements which have been developed during the intervening period and is being offered as the new Pratt & Whitney super-micrometer, Series B.

In the new model the moving parts, including the compensator, are entirely inclosed. The tailstock has been made stiffer and heavier, and the feel of anvils and work coming in contact is now said to be unmistakable. The tailstock outlines have been made symmetrical with the headstock and the whole appearance of the instrument improved.

The bar or support in which the standard disks are placed when setting the machine, is made soft instead of hardened. This removes a possible cause of dam-

age to the standards through accident or carelessness. Graduations on the dial and vernier are about 1/10 in. apart, instead of 1/50 in. as formerly. The calibration or reading remains the same—0.0001 per graduation.

In the Series B model the dial is approximately half the size of that used on the Series A super-micrometer. It was found that many operators were using the large graduated dial to the total neglect of the smaller knurled wheels for operating the machine. This practice resulted in tarnished dials, undependable readings, and in general defeated the purpose of the design. In the new model the graduated dial is provided with a small knurled portion, which will serve as a fingerhold, thus obviating the necessity of handling the graduated portion of the dial for any reason.



Pratt & Whitney's improved super-micrometer, Series B

The vernier scale is provided with an adjustment for bringing the zero lines into agreement. This adjustment is operated by a thumb screw, directly connected with the vernier.

The eight standards which are supplied with each machine are now furnished in a box which can be kept in the tool crib, or in the foreman's desk, thus removing the possibility of loss. The new method also eliminates the possibility of abrasion of the finished faces of the standard when removing or replacing the cover which was provided for their protection from dust. Owing to a large production it has been found possible to reduce the price below \$100.

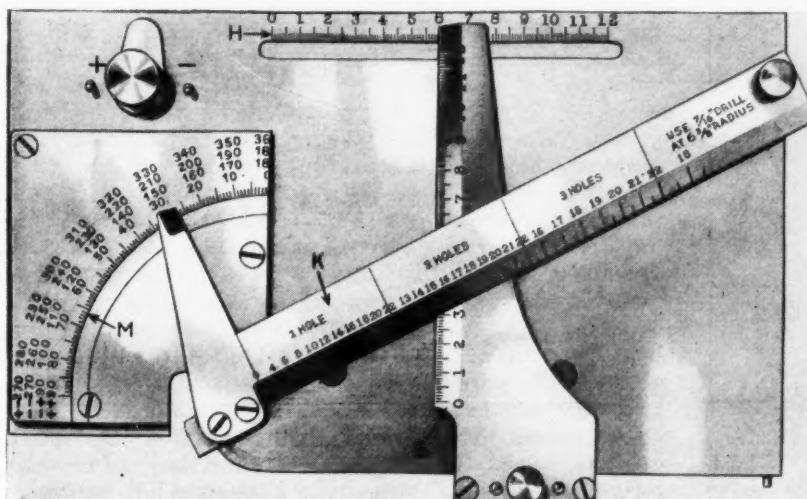


Fig. 3. Calculating device used with static balancing machine

Straight Bevel Gear Generator

A NEW design of generator for cutting straight bevel gears has been placed on the market by the Gleason Works of Rochester, N. Y. It generates

the teeth with two tools, using the same basic principle to obtain the tooth shape as embodied in other Gleason bevel gear generators. It is built as a complete unit for rough and finish cutting gears having a cone distance of $8\frac{3}{4}$ in. or less, ratios up to 10 to 1 and diametral pitches of 3 and finer.

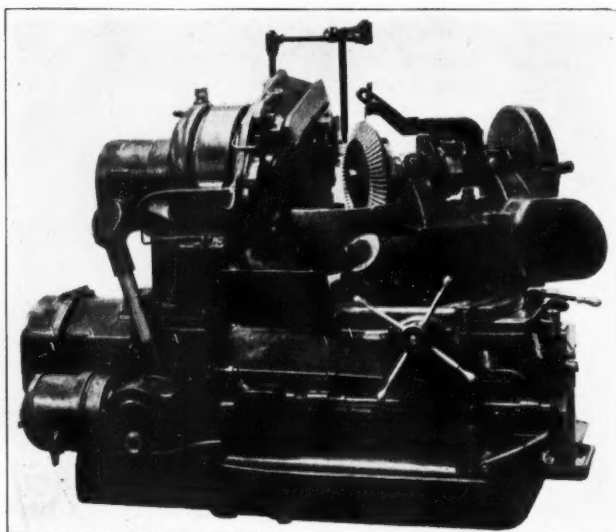
The drive for the tools is arranged to give the effect of a draw out. Each tool on the return stroke is mechanically relieved from the cutting surface a very small amount. As a result, high tool speeds are safe for producing a fine quality of work. Tool holders are case hardened. The bearing surfaces of the tool carrying slides and arms are arranged to overrun each other. One large gib on each slide takes up the wear in all directions.

A powerful and rigid support for the work head has been obtained by bolting the head base to a large sliding plate which moves on straight ways at right angles to the root line. The head can be withdrawn 5 in. to clear the tools. This is of great advantage in removing all kinds of work, or for inspecting the first tooth for size and finish without indexing around to a convenient position. The ratio of generating roll of tools and work is correctly obtained with change gears. The indexing is obtained with a mechanism of the stop wheel type. The index change gears are constantly under motion as they also function as gears in the generating train.

A double-roll generating method is used, as in this way a better quality of finish is obtained. By this method, a rough finish is taken over the tooth while the tool head is swinging in one direction, which is followed by a light finish cut as the tooth is being completed on the return roll.

The feed cam has two tracks, one for roughing without generating roll and the other for finishing with roll and means are provided for engaging the cam roller with either of these tracks. Generator tools of high speed steel are used that are interchangeable with those used on 8 in. manufacturing and 18 in. bevel gear generators.

Feeds—of which there are 20—range from 14.2 sec. to 2 min. 5 sec. per tooth. Seventeen tool speeds are provided ranging from 42 to 333 strokes per minute. Standard machines are arranged for either belt or motor drive. A 5 hp. motor of the built-in type may be used as illustrated or, if desired, the machine can be arranged for coupling on the motor.



Gleason 12-in. bevel gear generator

Landis Crankpin Grinder

IN grinding crankpins of multiple throw crankshafts it has been the custom to grind two pins in line with each other in one machine; then move the crankshaft to another machine and grind two other pins, and if the crankshaft happens to be for a six-cylinder engine, to move it to a third machine and grind the remaining two pins. Among the objections to this method are the cost of moving the parts from machine to machine, the need for space for moving and storing work at each machine, additional handling of shafts in loading and unloading the machines, more crankpin grinding capacity than there is need for, and the difficulty of lining up the different machines so accurately that spacing and indexing shall come within the inspection limits.

All of these disadvantages are said to be overcome in the Landis hydraulic crankpin grinder, of which an illustration is shown in Fig. 1. Greater production at

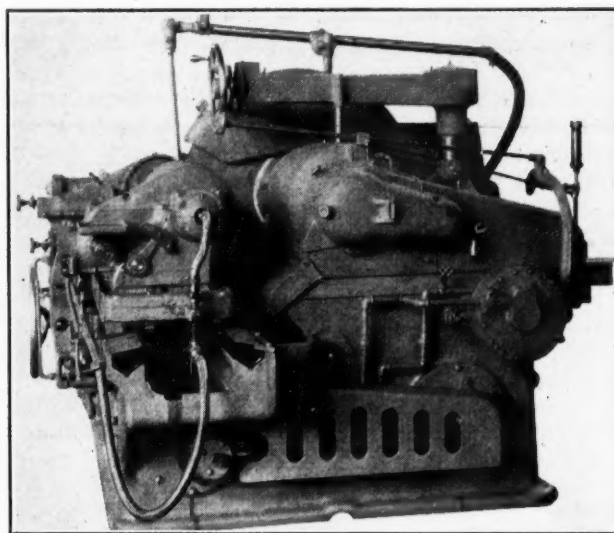


Fig. 2.—Right hand end of the crankpin grinder

less cost is also claimed. The machine is equipped with hydraulically operated clamps on the work-carrying fixtures; special indexing fixtures for obtaining proper angular relation between the pins; hydraulic power feed to the wheel head, both infeed and grinding feed; a rotary hydraulic motor to the work carriage for quickly moving the carriage to bring the various pins into the grinding position; an accurate spacing device for spacing the various pins in the proper relation to a fixed locating point on the shaft; a hydraulically operated work rest so located that it is always in front of the wheel and on the pin being ground, and a larger diameter grinding wheel which gives longer life and requires less dressing than machines equipped with what had previously been considered the regular diameter wheel for this class of work.

The machine is equipped with work heads which are driven through a longitudinal shaft so that both heads are driven in unison, the power being supplied by a 2 hp. motor driving through a worm and worm gear. The headstock spindles are driven through silent chains with provisions for taking up any lost motion and also provision for adjusting the alignment between them. The crank-carrying fixtures are integral with the spindle, thus eliminating numerous joints which make permanent alignment an impossibility. They are equipped with hydraulic work clamps with the full pressure maintained at all times. The

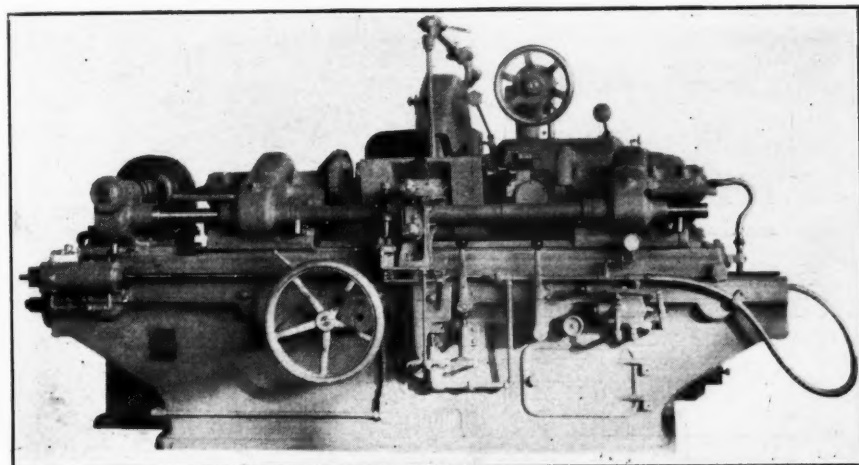


Fig. 1—Landis crankpin grinding machine, front view, with six-cylinder crankshaft in position

variation in throw for different shafts is taken care of by means of varying clamping blocks which are easily interchangeable. The hydraulic pressure which is applied to the clamps comes through the headstock spindles and is controlled by means of a valve within easy reach of the operator on the front of the machine. A safety device is provided so that it is impossible to rotate the heads until the shaft is securely clamped, thus eliminating accident.

The indexing fixture, which is incorporated in the fixture, locates the shaft either from the holes in the flywheel flange or from locating lugs on the cheek of the crank, although it is more satisfactory where possible to use the holes for indexing purposes. This fixture consists of a plate with plunger holes for the proper angular relation. In order to index, it is only necessary to release the hydraulic clamps and rotate the shaft in the carrying fixtures until the pins to be ground are on the center of rotation when the clamps are closed and grinding can proceed.

The spacing device consists of a rigid bar beneath the work table on which are securely fastened lugs which are in the proper location for the various pins on the shaft. A solid stop on the under side of the work table comes against the lugs on the bar, thus positioning the pins in the exact location with reference to a previously determined locating point. A lever on the front of the machine controls the position of the bar, bringing the proper lugs in position to engage the positive stop on the work table.

The stationary hydraulic work rest, which is an exclusive feature on the Landis machine, is rigidly attached to the bed of the machine so that it is directly in front of the grinding wheel, thus being always in position to support the pin being ground. It consists of two parts—the base, which is clamped rigidly to the bed of the machine, and the movable part which is operated hydraulically to bring the work shoes in position. This movable part is held against fixed stops by the hydraulic pressure, and the final adjustment of the work shoes is made by means of hand adjusting screws. In this way the actual pressure applied to the pin and the actual sizing are done by hand and are under the control of the operator. Stops are provided on the hand adjusting screws so that conditions can be duplicated on every pin being ground. The movable part of the rest has sufficient movement to be drawn back to clear the shaft when moving from one pin to another. The action is very simple, being controlled by a valve at the side of the

stationary part of the rest. When this valve is in one position the rest is moved to its extreme back position, giving necessary clearance for positioning or removing or putting in the shaft. When it is in the reverse position, the movable portion is in its extreme forward position with the work shoes against the pin being ground.

A rotary hydraulic motor is provided for moving the work carriage when positioning on the pins to be ground. A control lever which is always in the neutral position, except when the carriage is being moved, is located within easy reach of the operator.

A rapid hydraulic power in-feed is furnished to the grinding wheel head. This gives an easy and quick method of moving the grinding wheel

back out of the way when moving to the next pin and when removing or putting in the shaft. A lever located close to the feed-up hand wheel controls this rapid feed movement. When this lever is pushed away from the operator, the wheel head is moved away from the work at high speed until it reaches the back position, where it automatically comes to a stop. When this lever is pulled toward the operator, the wheel head comes in at high speed until the point where the wheel comes in contact with the work, when it automatically slows down to the predetermined grinding feed and continues to move in at this slow feed until it comes against a positive sizing stop. The grinding feed can be easily varied to meet any grinding conditions, while

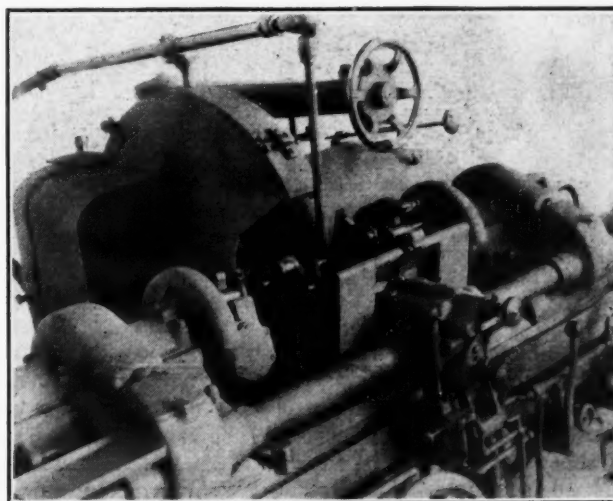


Fig. 3—Left hand view of the stationary hydraulic work rest in forward position supporting crankshaft in the grinding position, and Arnold gage on pin being ground

the positive stop can be changed to take care of any variation in the diameter of the wheel due to wheel wear or dressing. Also, the point where the wheel automatically slows down to the proper grinding feed can be varied to meet the actual conditions of the particular class of work being ground. A hand feed, which is similar in design to previous Landis grinding machines, is also provided and may be used independent of the hydraulic power feed if desired.

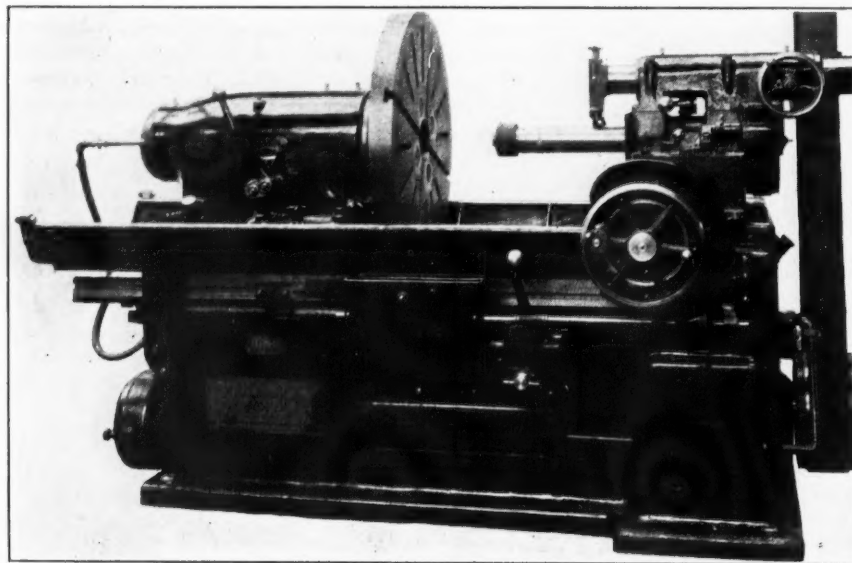
The grinding wheel head, which is rigidly supported on the bed of the machine, is designed to carry a large grinding wheel. The wheel spindle, made of

special alloy steel, heat treated and ground, runs in adjustable cap bearings which are automatically lubricated by oil under pressure. Provision is also made to provide pressure lubrication on the thrust bearings.

The machine is built in two sizes, 16 ft. x 32 in. and 16 ft. x 42 in., and is driven by two motors, a 20 hp. motor being used for the work drive and a 20 or 25 hp. motor, depending on the character of the work, for the grinding wheel drive. The wheel may be driven from a lineshaft through an auxiliary drive bracket if desired but the work is always driven by a motor with automatic control operated from the start and stop lever of the machine.

New Series No. 28 "Hydroil" Internal Grinder

THE Greenfield Tap & Die Corp., Greenfield, Mass., has added to its line of heavy duty internal grinders a new series of the No. 28 machine. Dif-

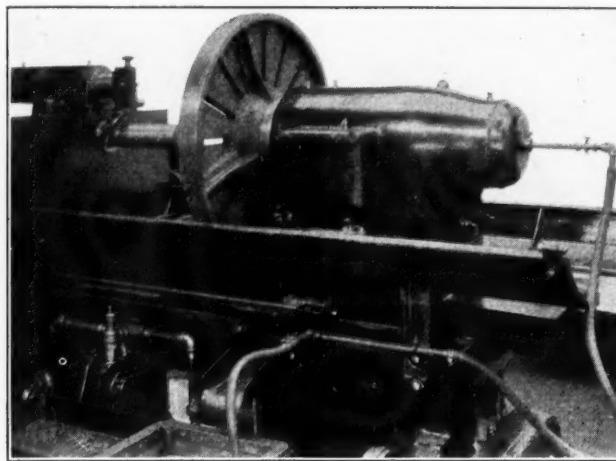


New Series No. 28 B Hydroil internal grinder with heavy duty work head (watch guard not shown)

ferent machines in the new series handle work with outside diameters up to 36 and 48 in. Changes and improvements in the base and cross slide which carries the wheel head have greatly increased the hole capacity. Both of these machines will grind a 32½ in. hole with a new 10 in. wheel. Ample wheel wear is provided for, because when the wheel is worn down to a minimum of 5½ in. it is still possible to grind a 28 in. hole. Also, a total belt stretch of 4 in. is allowed for the wheel spindle belt, that is, the belt may stretch this amount and the slack be taken up without any reduction in the hole grinding capacity.

The new series No. 28 Hydroil is also offered with different styles of work heads. Two new designs now available are the hollow spindle type and the heavy duty type. The former is of plain bearing construction and is provided with a large hollow spindle, having a 10 in. hole clear through for the accommodation of long cylinders, sleeves, hollow shafts, etc.

The heavy duty type is shown in the accompanying illustrations. This work head is of all ball bearing construction, and is made very rugged for taking

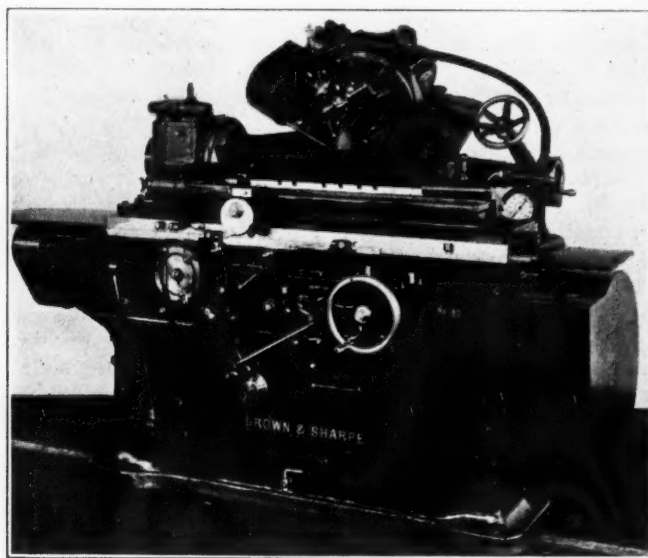


Close-up of heavy duty ball bearing work head on new series No. 28 B Hydroil internal grinder

heavy pieces of large swing. The work spindle is started or stopped by an operating lever at the front of the head, within easy reach of the operator's normal position. Throwing this lever operates a brake, which brings the work to rest quickly. Drive is by means of a belt from the drum in the base to the jack shaft and thence by silent chain to the work spindle. The work head, of course, swivels for taper grinding. The machine will face as well as grind internally.

Universal Worm Thread Grinder

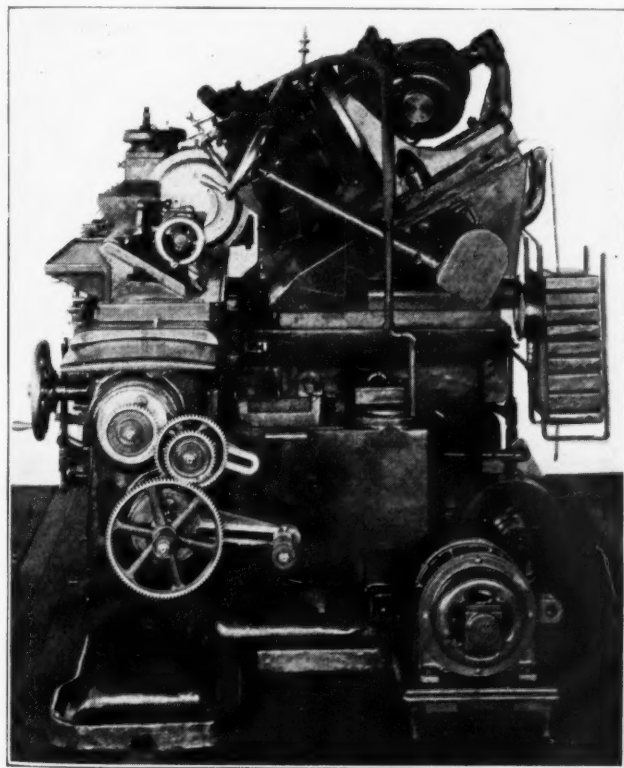
THE Brown & Sharpe Mfg. Co., Providence, R. I., has developed a universal machine for grinding worm threads, known as the No. 30 automatic worm thread grinding machine. It has been successfully



Brown & Sharpe No. 30 automatic worm thread grinder, front view

used on a wide range of work, both soft and hardened, including rear axle drive worms. This machine will grind worms with threads up to $1\frac{1}{8}$ -in. depth, either right or left hand, with any practical number of threads and any lead and pressure angle. It swings worms up to 8 in. in diameter, and the maximum length between centers is 24 in. One side of the thread is ground at a time, the worm being turned end for end to grind the opposite side of the thread. The grinding wheel operates while the table is traveling in one direction and is withdrawn while the table returns. Multiple thread worms are indexed during the return stroke.

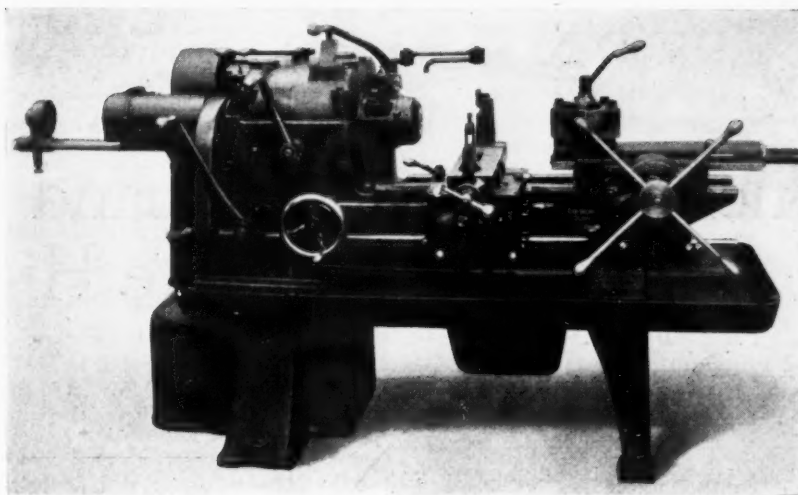
The wheel spindle is mounted on the upper of two slides, the lower of which is automatically fed to and from the work by a hydraulic piston arrangement. A travel of $1\frac{1}{4}$ in. is provided, so that the wheel clears the work while the worm is indexing and the table returning to the cutting position. Provision is made to swivel the wheel spindle through 180 deg. for handling worms of either hand. A diamond adjustable to the required pressure angle is used to keep the wheel shape correct. The wheel is



Brown & Sharpe worm grinder, right end view

moved into the diamond and therefore is always in a proper position relative to the worm center line. The wheel spindle is inclosed in a water-tight steel sleeve, the front box being of bronze, and the end thrust is taken by a ball thrust bearing. The belt pull is taken on ball bearings, and provision is made for adjustment for wear at the end of the spindle.

Power is furnished by two electric motors. A 5 hp. dynamically-balanced, ball-bearing motor mounted on the wheel slide drives the wheel spindle through a belt, and a 3 hp. motor on the rear of the machine operates



The new Warner & Swasey No. 4 turret lathe with six-speed, all-gear head and a power-feed cross slide

the rest of the mechanism. Both motors are controlled by a push button starter box.

The table travel is controlled by adjustable dogs, and 10 table feeds are provided, the change from one feed to another being easily made by turning a handle at the front of the machine. The depth of cut is controlled by moving the table endwise toward the grinding wheel. This may be done by hand or automatically after each complete revolution of the worm. Throw-out shoes on the feed ratchets permit a predetermined amount to be ground off. Indexing is accomplished by change gears on the left hand end of the bed. A safety device prevents the work from being indexed while the wheel is grinding and keeps the wheel from moving into the cutting position before the indexing is completed. The piece is indexed after each pass of the wheel, so that any variation due to wheel wear is distributed over the different threads of the worm being ground. The correct lead is obtained by change gears on the right hand end of the machine, different combinations being used for different leads in the same manner as when cutting leads on a milling machine.

The headstock spindle has a hole 3 in. in diameter, so that, if it is not desired or possible to use centers, worms with shafts 3 in. or less in diameter can be ground from their own journals. One end of such a shaft may be inserted in the headstock in a bushing and a special footstock with another bushing used to support the other end of the shaft.

New No. 4 Turret Lathe

THE Warner & Swasey Co., Cleveland, Ohio, is announcing a new No. 4 turret lathe with a bar capacity of $1\frac{1}{2}$ x 10 in. and with a capacity for checking work up to an 8 in. swing. The new No. 4 is made in three types of head, viz., a six-speed all-gear head, a six-speed cone head and a 12-speed all-gear head.

One or the other of two types of cross slide is furnished with this machine—power-feed and plain screw-feed. In the power-feed cross slide, six power cross feeds are provided. These six feeds are obtained by levers mounted on the carriage apron which are very convenient for the operator. Longitudinal feed is by a hand wheel, mounted on the front of the machine, near the head end. A round tool post is provided on the front of the power-feed cross slide carriage, and a holder for a cutting off tool is used on the rear of the carriage.

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

Saturday, April 2, 1927

Increasing Retail Demand Brings Factory Rate High

PHILADELPHIA, April 2—Indications are that March production for all manufacturers considered as a group, outside of Ford, will at least equal if not exceed March of a year ago and the demand for cars is such that the industry will probably show further gains in April.

All units of General Motors, Chrysler, Hudson-Essex, Reo, Hupp, Packard, and Studebaker, in the Michigan district, are reported as operating on large schedules, while Willys-Overland at Toledo and Nash at Kenosha are indicated as unusually active. Production was also resumed this month on a substantial scale in Durant's Lansing factory.

Reports from various parts of the United States indicate that the early spring weather has acted as a great stimulus for sales, and various producers are finding their resources taxed to take care of the demand for cars.

A study of production figures and retail sales for the past several months would indicate that dealer stocks are lower than a year ago. As a result of a sharp curtailment in production by practically all producers during November and December it appears that dealers were afforded the opportunity of bringing their stocks to a very favorable level early this year and this condition is reflected in increased production schedules.

Wilmer Says Six Ready Next Month

DETROIT, March 30—Official statement that the new Dodge Brothers companion car to the present line would be a six was given by E. G. Wilmer today, who added that the new car would sell for \$1,650 and would go into production next month in the new Plant 6, just completed. The company is already assured of enthusiastic dealer reception of the new product, he said.

Sales and profits during the first two months have shown a reduction as compared with last year, Mr. Wilmer said, but earnings are in excess of all interest charges, dividend requirements on preferred and usual reserve for depreciation. Since March 1 dealer deliveries have shown a steady increase and cars in dealers' hands have decreased.

Gardner Adds Coupes

ST. LOUIS, March 30—Gardner Motor Co. is introducing two models on its series 80 chassis, a victoria coupe and a brougham coupe, each of which lists at \$1,695 and with de luxe equipment \$1,795.

Durant Sells Ford L. I. City Factory

NEW YORK, March 31—The Long Island City factory of Durant Motors, Inc., one of the original properties of the company, has been sold to Ford Motor Co. it was learned this week. No statement has been made as to the terms of sale nor the use to which Ford Motor Co. will put the plant. Under Durant ownership the plant has been used for development work and for manufacturing at different periods. Recently it has been only partly occupied as a storage building and a service station for Flint cars in the New York district.

The Long Island City plant was originally a Ford assembly plant. Durant first used it to make the Flint Car.

Another move toward the consolidation of the automotive enterprises in which William C. Durant has been interested was accompanied this week by the appearance of advertisements saying that Mr. Durant's "first efforts will be largely devoted to the aggressive promotion of the Star Six."

Despite this announcement, which tended to confirm the opinion held in automotive circles, rumors of mergers persisted.

Dillon, Read Make Denial

One of the prevailing rumors was spiked when Dillon, Read & Co. definitely denied having had any conversations with Mr. Durant regarding automobile mergers.

Durant Motor Co. of New Jersey, controlled by Mr. Durant, has offered to acquire common stock of the Durant Motor Co. of Michigan, an affiliated company, through exchange of 6 per cent preferred on a share-for-share basis.

The Durant Motor Co. of Michigan is capitalized at \$2,871,800 of \$10 par stock, according to the only available records, and this is all publicly held, except a part thought to have been acquired either by Mr. Durant personally or one of his companies.

The 6 per cent preferred stock of Durant of New Jersey, which is being offered for exchange, is convertible on or before May 1, 1928, on a basis of one share of preferred for two of common

INSTRUMENT TESTS COMFORT OF SEATS

WASHINGTON, Mar. 31—A new instrument which records the degree of comfort or discomfort in automotive vehicular construction has been developed by the U. S. Bureau of Standards, it was announced here this week. The device, known as the accelerometer, is being tested on the seats of different type vehicles in Washington.

The instrument measures the force exerted in the motion of the vehicle with respect to the relative comfort of its passengers, the record being made by means of an electric current operating only when acceleration is excessive.

The bureau expects soon to be able to make definite recommendations as to the most comfortable types of seats for various classes of vehicles.

and it is subject to retirement at \$12.50 a share after Jan. 1, 1929. A special meeting of stockholders of the Michigan company has been called for May 5 in Lansing to act on the proposal.

Durant Motors, Inc., which is the parent company of the Durant enterprises, is incorporated under the laws of Delaware with 1,000,000 shares of no par stock. This company, which was organized early in 1921, in May, 1924, acquired Star Motors, Inc.

Oakland Raises Schedule to 22,000 Cars in April

DETROIT, March 30—Oakland Motor Car Co. plans to build 22,000 cars in April, an increase of 5000 over March, according to W. R. Tracy, vice-president in charge of sales. The company's previous high month was August last year, when 17,000 cars were built.

Mr. Tracy said Oakland has more orders on hand now than at any time in history.

Willys Export to Sell Gramm

TOLEDO, March 30—Willys-Overland will not enter the domestic market with a line of trucks, factory officials here say. The John N. Willys Export Corp. has made arrangements to handle Gramm trucks made in Lima instead of foreign makes.

Henry Ford Victim of Speeding Driver

Suffers Concussion and Possible Internal Injury When Car is Forced From Road

DETROIT, March 31—Henry Ford is a patient in his own hospital here following an automobile accident in which his small car was crowded from the road near the Dearborn laboratory by a larger car which came from behind and sped by. The identity of the larger car is being sought by police who are also investigating the possibilities of intent behind the incident.

The most serious feature of Mr. Ford's injuries is that he has given indication of internal injury though Dr. R. D. McClure, chief surgeon at the Ford Hospital, said these symptoms had cleared up. The hospital bulletin also said that Mr. Ford had suffered a slight concussion. Severe contusions over the ribs and back, with considerable strain of back muscles will keep him in bed for several weeks, but Dr. McClure said Mr. Ford's condition cannot be said to be serious in any way.

Returning From Laboratory

The accident occurred soon after dusk Sunday evening. Mr. Ford was returning home from the Dearborn laboratory when the crash came. Recounting the accident, Mr. Ford said he was forced over the narrow curbing and plunged down the embankment. The car crashed into a tree and overturned, Mr. Ford being knocked unconscious. Snow and rain beating through the broken window of the coupe revived him. He turned off the engine of the car, and made his way slowly to the gate of his estate. Several times he had to stop and rest, despite the falling sleet.

Mrs. Ford was hastily summoned to the gateman's lodge and Mr. Ford was brought to the house where Dr. McClure attended him. His condition was not satisfactory on Tuesday and he was brought to Ford Hospital in an ambulance. Later bulletins from the hospital have all been favorable.

Court Action Brings News

A statement of the accident was made by representatives of Mr. Ford in Federal Court here, where he is defendant in a suit for \$1,000,000 brought by Aaron Sapiro. Mr. Ford has been summoned as a witness. The news of the accident had been suppressed up to the time of filing the court statement.

Mr. Ford's career in the industry has been singularly free from any periods of illness or injury, so much so that it has been infrequent that any attention has been called to the condition of his health. He has long been a devotee of the simple life and has spent a large part of his time outdoors. He has paid particular attention to his physical condition and has taken a deep personal

interest in the physical condition of those about him.

To guard against the possibility of any similar accident in the future, it is planned to have Mr. Ford accompanied or followed by a companion. For years Mr. Ford has persisted in going about unaccompanied particularly in and about his plants. When travelling he usually has a retinue.

'26 Export Increase Due to Bus-Truck

WASHINGTON, March 30 — Although America's total export trade in 1926 showed a decrease, automobile exports, amounting to 4.6 per cent of the total, showed a slight increase. The total value of exports for the past year was \$4,808,000,000, about \$101,000,000 less than the year before. Automotive exports totaled 305,364 units, valued at \$223,716,000, 2305 more than in 1925, it was announced here by the Chamber of Commerce.

The automotive increase was entirely in motor trucks and buses. Exports of passenger automobiles in 1926 totaled 238,481, or 5825 less than in the preceding year, with a decline in value of \$8,405,000. Truck and bus exports totaled 66,775 units in 1926, or 8150 more than in 1925, with a gain in value of \$9,376,000. Exports of electric automobiles decreased from 128 to 108. Exports of automobile engines, tires and tubes all decreased.

Shipments of motor fuels, petroleum and its products in 1926 were \$81,243,000 higher in 1926 than in 1925, of which the greatest increase was in the motor fuel classes, totaling nearly 500,000,000 gal.

New Budd Wire Wheel Has Large Hub Shell

PHILADELPHIA, March 30—Budd Wheel Co. has perfected a wire wheel which is now available in many sizes. The company says previous disadvantages of wire wheels have been practically overcome. The spokes are heavy, short and straight, so that they can be fastened directly to the hub shell, which eliminates the danger of breaking. The hub shell is large enough to protect the brake drum and fastens to the hub on the same mountings as the Budd-Michelin disk wheel. The large hub shell also reduces the length of the inner spokes, materially increasing the strength of the wheel as a whole.

P-A Adds Club Sedan

DETROIT, March 30—A close coupled five-passenger four-door club-sedan, listing at \$3,300, has been added to the Model 80 chassis by Pierce-Arrow Motor Car Co. Built-in trunk, bumpers front and rear, spare tire, shock absorbers, automatic windshield wiper, Winter-front and rear vision mirror are included in the equipment. Finish is in optional pyroxilin colors.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, March 30.—The general trend of business last week was upward, notwithstanding the retarding influence of such factors as a return of wintry weather, an unusually late Easter, declining grain prices and the grave Chinese situation. The rate of steel production was very nearly equal to the peak of last year. The general level of commodity prices advanced, while stock quotations were irregular with a moderate downward tendency. Aside from a slight temporary increase in the call loan rate, the money market remained at the low levels of a week earlier.

FREIGHT CAR LOADINGS

The first million-car week of the year in freight loadings was the week ended March 12, when the total was 1,005,715 cars, as against 994,931 cars in the preceding week and 967,425 cars in the corresponding period last year. Never before has this figure been reached so early in the season. Freight traffic handled by Class 1 railroads in January marked a new seasonal record, amounting to 39,223,400,000 net ton-miles, or 1,547,763,000 net ton-miles more than in January, 1926.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended March 23 were 7.1 per cent below the total for the preceding week but 10.7 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 140.4 last week, as against 139.6 a week earlier and 141.4 two weeks earlier.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve Banks increased \$5,900,000 during the week ended March 23, gains of \$126,600,000 in discounts and \$12,400,000 in open market purchases being largely offset by a decline of \$133,100,000 in holdings of Government securities. Note circulation decreased \$4,600,000, while deposits gained \$6,300,000 and reserves \$8,400,000. The reserve rose from 79.0 to 79.2 per cent.

During the same period, loans of reporting member banks declined \$23,000,000, with decreases of \$1,000,000 in loans secured by Government obligations and \$27,000,000 in loans secured by stocks and bonds and a gain of \$5,000,000 in "all other" loans. Investments declined \$13,000,000 and net demand deposits \$173,000,000, while borrowings from the Federal Reserve Banks increased \$120,000,000. Loans to brokers and dealers, secured by stocks and bonds, made by reporting member banks in New York City, declined \$38,000,000.

Overland 1926 Net Totals \$1,819,689

Company Makes Large Expenditures for New Car Development and Promotion

TOLEDO, March 28—Willys-Overland Co. and subsidiaries for the year ended Dec. 31, 1926, report net profit of \$1,819,689 after depreciation, federal taxes, engineering and development expenses, liquidation of taxi division, plant and equipment dismantling expenses and interest. This is equivalent after preferred dividends to 22 cents a share earned on 2,526,362 shares of common stock against \$11,422,777 or \$4.36 a share on 2,264,661 shares outstanding in 1925.

Plant assets as of Dec. 31 disclosed surplus of \$25,005,319 against \$25,819,582 at the end of the preceding year. Current assets were \$34,286,993 and current liabilities \$8,144,767 against \$42,715,004 and \$5,544,910, respectively at the end of 1925.

The \$9,412,765 profit from operations was after charges of \$2,550,634 for depreciation of fixed assets and after absorbing exceptionally heavy sales promotion expenses incident to the introduction of the complete new line of cars and the establishment of the new trade name "Whippet," John N. Willys, president, points out in the report. All engineering and development expenditures made during the year, amounting to \$3,430,894, were also charged off.

"The necessary period required for the manufacturing changes preparatory to launching each of the new models in an active selling season resulted in the loss of a ready market for at least 50,000 cars, with a consequent severe loss of income," says Mr. Willys. "In spite of this handicap car sales for the year were 179,103.

Taxi Division Liquidated

"Another abnormal charge which the directors deemed advisable to take in full at this time arose from the liquidation of the taxicab division. Operation of this department when inaugurated gave great promise but proved unprofitable, as was the common experience of companies in this field as the result of protracted taxicab rate wars. To permit concentration of manufacturing energies upon standard passenger car production, the liquidation of this division was determined upon and completed.

"The year saw the completion of a comprehensive program of plant modernization, equipment rehabilitation and the revamping of manufacturing processes, involving an expenditure of \$12,500,000. This has enlarged capacity and made possible lowered costs. Heavy depreciation and write-offs have established the value of manufacturing plants and equipment as of Dec. 31, at \$26,718,328."

1927 ROAD BUILDING TO ADD 26,841 MILES

WASHINGTON, March 31.—A total of 26,841 miles of new highway will be constructed throughout the United States during 1927, in addition to the maintenance of 239,847 miles, now already constructed, according to data compiled from the states by the U. S. Bureau of Public Roads. Of the new construction, 7489 miles will be concrete and asphalt, 12,395 will be gravel and macadam, and 6957 will be earth improved.

To carry out this construction program the states will expend a total of \$648,483,000. Added to this will be the sum of \$475,000,000 expended by counties.

F. E. Wadsworth Dies in Florida

DETROIT, March 28—Frederick Eliot Wadsworth, retired automobile body manufacturer, died in Palm Beach, Sunday. Funeral services were to be held there this week.

After finishing school in Connecticut, his native state, Mr. Wadsworth came to Detroit to work for Hugo Scherer, leather manufacturer and wholesale dry goods dealer. He saw the possibilities afforded in the automotive industry and organized the Wadsworth Mfg. Co., of which he remained the active head until six years ago when he retired on account of failing health.

During his residence here, Mr. Wadsworth was a member of the Detroit Club, Boat Club, Grosse Pointe Club, Grosse Pointe Country Club, and the Old Club of St. Clair Flats.

His wife, formerly Mary Mannering, one of America's best known actresses, his son, Horace, and daughter, Mrs. Stanley Robinson, were with him when he died.

F. K. Chaffee

PITTSFIELD, MASS., March 29—Frederick K. Chaffee, one of the pioneers in the motor industry and whose early work dates back to the middle nineties, died today in California. Mr. Chaffee had the Franklin, Hupmobile and Mack agency here and was one of the best known motor men in this part of the state.

His interest in the truck industry began with the development of the Alden Sampson truck which he aided in the development of more than twenty years ago.

Advance-Rumely Net

NEW YORK, March 26—The Advance-Rumely Co. annual report shows net income of \$440,369 in 1926, against \$540,577 the year previous. Gross profit from 1926 operations was \$3,244,363, against \$2,824,041 in 1925.

Tire Pace Slackens After Busy Quarter

Akron Enjoys Largest Early Year Business Since 1920 —Prices May Rise

AKRON, March 28—Sales and production of automobile tires so far this year by Akron factories have been greater than in any other first quarter since 1920. Following this almost unprecedented activity during a period which is normally slack for the tire business, indications are that the peak output has about been reached for the first half year.

Dealers' stocks, which were low at the beginning of the year, have been largely replenished and dealers from now on will devote more of their attention to the needs of consumers. Spring dating sales in the last two months have been heavy.

With a few exceptions, leading rubber companies are preparing to ease off a little on tire production so that large surplus stocks will not be accumulated. No substantial curtailments are anticipated but operations will not be pushed as has been the case in the past six or eight weeks.

An increase in tire prices may be made sometime in April, according to current reports. Manufacturers agree that present schedules are at the bottom, and declare an advance would be justified in view of the higher prevailing cost of raw materials.

Many rubber companies are building additions in anticipation of increased business. Purchases of new machinery have been large. Introduction of new balloon tire tread designs has meant a boom in business for the manufacturers of cores and molds.

India to Reduce Tariff

WASHINGTON, March 28—A reduction of import duties on automobiles and tires into India is proposed in the annual budget of the government, according to cable advices to the automotive division U. S. Department of Commerce. These reductions would amount to a decrease from 30 to 20 per cent ad valorem on passenger cars and from 30 to 15 per cent on tires, ad valorem.

Akron Now Bonded Port

WASHINGTON, March 26—Akron, Ohio has been made a customs port of entry by the Treasury Department by an executive order. Its designation was ordered after a conference this week with Treasury officials and business men of Akron, including representatives of the rubber industry.

Names Coast Agents

CHAMBERSBURG, PA., March 26—Chambersburg Engineering Co. has appointed Herberts Machinery & Supply Co., Los Angeles, exclusive agent in California.

Ruddon is Named Federal Director

Is Also Elected to Vice-Pres-
idency—W. W. Smith
New Sales Head

DETROIT, March 26—F. L. Pierce has resigned as sales manager of the branch division of the Federal Motor Truck Co. and has been succeeded by his former assistant, W. W. Smith. Mr. Smith has been with Federal for two years and previous to his appointment was vice-president of the Federal Motor Truck Sales Corp., a position he will continue to hold in addition to his new duties. Before joining Federal he was secretary of the Chamber of Commerce of Elyria, Ohio, and, before that had served as sales promotion manager of Willys-Overland Co., and sales manager of Garford Motor Truck Co. He has had 15 years' experience in the motor truck field.

The election of R. W. Ruddon as vice-president of the Federal Motor Truck Co. was confirmed at the meeting of the board of directors of the company, this week, at which time he was also made a member of the board of directors. Mr. Ruddon joined Federal in 1914 as personal secretary to M. L. Pulcher, president. In 1918 he was made assistant secretary of the company and in 1925 was named assistant general manager. He now holds the three titles in the company, vice-president, assistant general manager and assistant secretary. Previous to joining Federal he was connected with General Motors Corp., and before that had served as personal secretary to Truman H. Newberry.

Cleveland Company Low on N.Y.-Chicago Air Mail

CLEVELAND, March 28—The North American Airways Corp. of Cleveland, was low bidder last Thursday when bids for private operation of the New York-Chicago air mail were opened in Washington. The Cleveland group bid against the National Air Transport Corp., financed by Detroit capital. The North American corporation was formed especially to bid for this air mail contract. Its backers were J. L. Jones, president of the Cleveland Steel Co., and William Taylor, vice-president of the North American Coal Corp. It was capitalized with 500 shares of no par value common.

Newton D. Baker was directing legal details at a reorganization meeting today. Plans were being drafted to increase the capital to \$500,000 paid in. New York interests not yet known are to be taken into the corporation.

Planes of a type never before flown into the Cleveland airport will be used providing the contract is secured. These will be 14 Wright-Bellancas powered by air-cooled engines. These were designed by Giovanni Bellancas.

A.R.A. OFFERS \$750 FOR SAFETY ESSAYS

WASHINGTON, March 30—Alarmed at the growing list of grade crossing accidents to motorists in the United States, the American Railway Association, from its headquarters here, this week announced the inauguration of a nation-wide essay contest among school children and college students to minimize such accidents.

Three prizes of \$250 are to be awarded for the best essays on "Cross Crossings Cautiously." The contest will close June 1. The essays are to be mailed to the Safety Section of the American Railway Association at 30 Vesey Street, New York City.

Canadian Manufacturers Name Association Head

TORONTO, March 30—Formal announcement has been made of the organization of the Canadian Auto Manufacturers & Exporters Association, with headquarters in Toronto, in succession to the Automotive Industries of Canada. The new association includes all car manufacturers in the Dominion with the exception of Ford Motor Co. of Canada, Ltd., and Willys-Overland, Ltd. Major Fred W. Hobart, formerly in charge of the excise tax department of the Department of Customs, Ottawa, has been appointed general manager of the new association and offices have been opened in the Lumsden Building, Toronto.

The primary purpose of the new association, it is stated, is to provide a means of cooperation between the various Canadian companies, particularly in dealings with the Canadian Federal Government. The latter can also avoid duplication and confusion by contact with the association, thus reaching the industry through the one office, it is pointed out.

Motor Wheel at Peak

LANSING, March 28—According to Harry F. Harper, president and general manager of Motor Wheel Corp., March will mark the greatest month for sales and deliveries in the history of the corporation. Speaking of the second quarter, Mr. Harper said that April and May promise very happy production schedules for all units of the corporation.

Rockford Plant Expands

ROCKFORD, ILL., March 26—The Barber-Colman Co. next week will add 80,000 sq. ft. to its plant space, which will become in excess of 400,000 sq. ft. The plant manufacturing machine tools and textile machinery is running at capacity. The Barber-Colman company is widely known in automotive trade circles for its gear cutting and other automobile manufacturing machines.

Diamond Finds Aid South African Trade

Large Demand for Motor
Transportation Follows—
Farm Conditions Poor

JOHANNESBURG, South Africa, March 1 (by mail)—The annual motor shows commence in South Africa with the opening of the new motor hall at the show grounds, Johannesburg, in April. Then it is anticipated that over 100,000 people will attend. The South African Motor Traders' Association has arranged for a very fine display, and it is anticipated that most of the cars manufactured in America, besides many from England and Europe, will be represented. There will be a section for trucks and accessories.

The great diamond fields at Lichtenburg, Transvaal, have helped motor dealers throughout the Union of South Africa. Phenomenal finds have attracted about 100,000 people (whites and blacks) to these fields and motor transport is greatly in demand. It is estimated that there are about 4000 cars and trucks in use at the diggings and the total number of motor vehicles in the district is about 10,000.

New fields have recently been proclaimed, and record rushes of diggers have taken place. These fields are extraordinary in that a large proportion of the diggers have made finds and thus car and truck sales are continuing. Apart from the diamond diggings the country has experienced rather a setback due to severe droughts in all parts of the Union. If it were not for the diamond fields, prospects for the last half of 1927 would not be so good, for farmers are feeling the drought very severely.

Light Trucks in Demand

General Motors assembly plant at Port Elizabeth has been kept busy with the demand for light trucks, and Ford has also had many orders from the diggings. It is estimated that the present diggings will last for two or three years, but new finds are continually being made, the latest being only 30 miles from the city of Johannesburg. The Lichtenburg fields are about 150 miles from the gold center of Johannesburg.

The latest car arrivals in South Africa are the Jordan eight and the Dodge Brothers' business sedan. The Chrysler small job has been here for a little while, and has sold well. The Overland Whippet also attracted quite a deal of notice. The Erskine model Studebaker has just arrived at the coast and is awaited inland by dealers who have heard a great deal about this little car.

The trend toward closed cars in town and country continues, and dealers now estimate that open types are losing out rapidly. The two-door type of closed job is not nearly as popular as the four-door.

Bay State Finds Insurance Snag

Failure of Owners to Pay Premiums Brings 3000 License Revocations

BOSTON, March 25—The prophecy of some of the automobile men who fought the Compulsory Insurance Law that many motorists would get policies and then forget to pay the premium for the first quarter is being brought out now by the statement of the Motor Vehicle Department that by April 1 at least 3000 owners will have their registrations revoked. Already the insurance companies are turning in the names of about 200 a day who have not yet paid, and they have 15 days' grace. Next the registrar has been notifying these owners that revocation is coming and many have already taken place. The motorist has 15 days to turn in his plates. If he does not then the police are notified. In a few cases brought before the courts for running without insurance the fines have been \$100 to \$150 showing that the judiciary is going to uphold the law.

Just what will happen about April 1 when several thousand revocations take place is being watched with interest. Many insurance agents and brokers in their anxiety to get business wrote out policies and sent slips to the registrar approving the granting of licenses. Then they expected that the motorists would pay them "when they got around to it." The awakening came this month with the first quarter slipping by and no payments.

Apparently what the majority of these owners figured out was that by doing this even if their registrations were revoked they could register for \$2 the same vehicle, and thus save the first premium minus the \$2, and run all the first three months covered for practically nothing. Whether the insurance companies will get together and refuse these owners reinsurance presents another legal question. It seems further proof that the law was ill advised, and more theoretical than practical.

Maryland "Clincher" Puts Insurance Away

BALTIMORE, March 25—Compulsory automobile insurance in Maryland is a dead issue for at least three years. Efforts to have the Maryland General Assembly, now in session at Annapolis, enact legislation providing for compulsory insurance has been lost by an overwhelming vote. The bill was rejected in the House of Delegates and in order to prevent further consideration at the present session the "clincher" was put on the measure. This means that during the present session of the General Assembly the House of Delegates will be unable to consider any bill containing

the same subject matter. Another compulsory insurance bill is pending in the State Senate and should that body pass it and send it to the House the latter would be barred from considering it.

The subject of compulsory insurance on automobiles has been one of the most important matters before the present session of the General Assembly. An increase in the state tax on gasoline has been one of the few others. The insurance bill which was killed in the House was prepared at the request of Carville D. Benson, state insurance commissioner. The Committee on Insurance and Loans reported the measure without recommendations. James J. Lindsay, Jr., the majority floor leader, who introduced the legislation, moved that the bill be substituted for the report, favorable action on which would have been equivalent to a favorable report by the committee. This motion was voted down and it then was moved that the bill be tabled. This was carried by a vote of 65 to 26. An effort to reconsider the vote and make the bill the subject for debate on a future date was lost. This was followed by the "clincher," which is brought about by reconsideration of the vote by which a bill is tabled and tabling the reconsideration.

Kansas Companies Free to Determine Own Rates

KANSAS CITY, March 28—Automobile risk companies operating in Kansas will be permitted to charge whatever rate they desire for all kinds of automobile insurance except fire, for the next two years at least, according to Capt. William R. Baker, state insurance superintendent.

Captain Baker points out the Legislature has adjourned without passing bills that would have given his office power to regulate motor car insurance rates in the state. An increase of 35 per cent recently was put in force in Kansas.

There is a general impression, Captain Baker said, that his office already has power to regulate insurance rates on motor cars but this power is limited to fire, he said.

Studebaker Ships 940

SOUTH BEND, March 28—Studebaker has established a new high record for shipments in a single day with the ticketing of 940 Studebaker and Erskine models on March 24. These included shipments from plants here and in Detroit and Walkerville, Ont. The best single day's mark was set Feb. 28 with the shipping of 752 cars.

Stewart Names Agent

NEW YORK, March 30—F. M. Malany has been appointed New York representative of the Stewart Die Casting Corp., Chicago, manufacturer of die casting and bronze bearing metal. Mr. Malany's headquarters are in the Singer Building.

Safety Progressing, Hoover Tells A.A.A.

Sees Holding Former Rate in Face of Car Increase Hopeful Sign

WASHINGTON, March 30—Definite progress is being made toward solution of the problem of street and highway safety, Secretary of Commerce Herbert Hoover told secretaries and managers of motor clubs and associations affiliated with the American Automobile Association at the third annual congress here this week.

"Our toll of fatalities still continues around 20,000, with accidents around 500,000 a year," Secretary Hoover said. "But the fact that these figures have been held down while the mileage traveled by automobiles and the number of automobiles has greatly increased indicates a hopeful measure of success."

General problems facing the 862 clubs affiliated with the A.A.A. were discussed and a large portion of the sessions was devoted to a review of the growth of organized motordom. During the past year 150,000 new members joined A.A.A. clubs and the year was characterized as the most successful in the history of the body.

Cooperation of automobile dealers and motor clubs was urged by Stanley H. Horner, president of the Washington Automotive Trade Association. Other speakers condemned fee system courts as operated throughout the country. It was estimated that fines levied upon motorists for violations of the traffic regulations throughout the country total \$100,000,000 a year.

Further impetus was given to the movement for establishment of a uniform national traffic code. The delegates went on record in favor of extension of the school boy patrol system throughout the nation following production of figures showing its value as a safety measure.

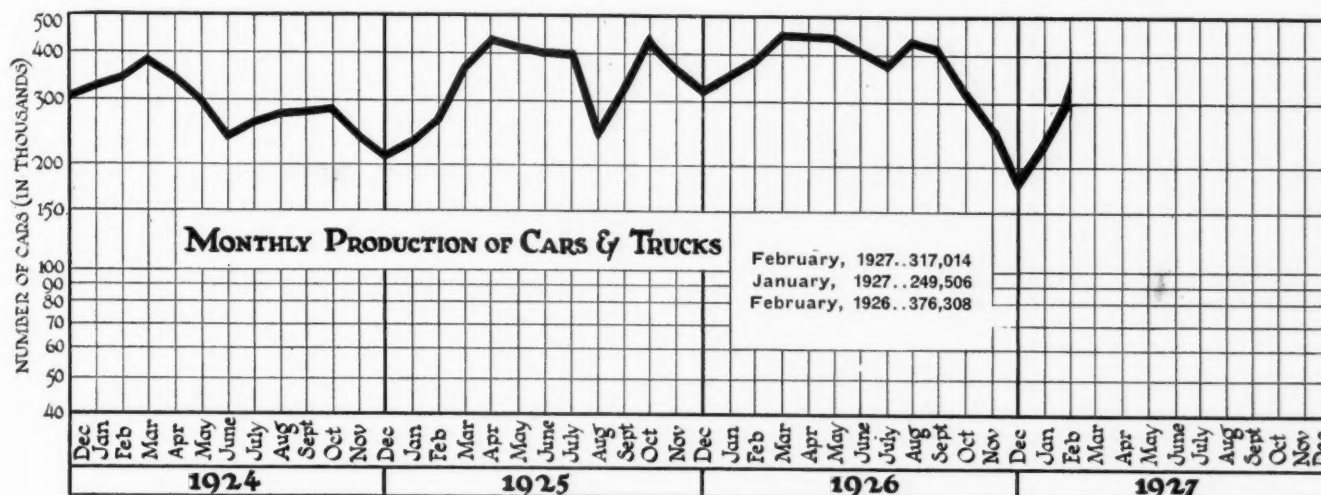
Finnish Imports Gain

NEW YORK, March 29—Finland in 1926 imported 5155 automobiles, as compared with 4172 in 1925. This does not include chassis without body, which are imported in considerable numbers and equipped with locally built bodies. The value of the complete cars imported was 142,800,000 Finn. marks in 1926 and 99,300,000 marks in 1925.

Swedes Ask Import Duty

WASHINGTON, March 26—A petition that an import duty of 10 per cent ad valorem on all automobile parts and accessories, including those of rubber, be levied on goods brought into Sweden, has been filed with that government, signed by the Board of Customs and the Board of Trade of Sweden, according to advices received by the U. S. Department of Commerce.

February Continues Production Increase



Segrave Sets Mark of 203.79 at Daytona

DAYTONA BEACH, FLA., March 30—With a world's speed record of 203.79 miles an hour established by his 1000 hp. Sunbeam racing car, Major H. O. D. Segrave will remain in the United States only long enough to supervise the crating of his car for its return shipment to England and will take ship himself April 6. No further records will be sought.

The official chart on his speed trials, compiled by Odis Porter, official time-keeper for the American Automobile Association, follows:

Trip.	Dist.	Time (In Secs.)	Miles (In Hrs.)	Kilometers (In Hrs.)
North ... 1 Kilo	11:20	199.7259	321.4285	
North ... 1 Mile	17:94	200.6688	322.9364	
North ... 5 Kilos	56:47	198.0637	318.7533	
South ... 1 Kilo	10:84	206.3590	332.1033	
South ... 1 Mile	17:39	207.0155	333.1500	
South ... 5 Kilos	53:90	207.5076	333.9517	
Mean average determined by averaging times:				
1 Kilo	11:02	202.9883	326.6787	
1 Mile	17:665	203.7928	327.9637	
5 Kilos	55:185	202.6757	326.1755	

The judges were Garvin Wood and T. E. Myers.

The trials were witnessed by 30,000 spectators. Seen from the timer's stand the racer appeared far down the beach a speck that grew with incredible rapidity. Almost before spectators knew the car was approaching it roared past, the overhead exhausts spurting flame and smoke and filling the air with burning castor oil fumes.

With the brakes applied the car swept on for two and one-half miles before stopping, the aluminum brake shoes melting. On its return course the trial was made without brakes. Sometime an oil brake working by compression may be developed which may stop a car at this speed, Major Segrave said.

The greatest speed indicated by the tachometer at any point of the test, Major Segrave said, was 2200 r.p.m., equivalent to a speed of 211 m.p.h.

Ford to Show St. Paul Plant

ST. PAUL, March 28—One hundred thousand responses are expected to an

invitation to people of the Northwest by S. A. Stellwagen, manager of the Ford Motor Co. plant here, for the first public view of the now completed factory. The dates are April 3-8. In 1926 \$40,000,000 of cars were sold through this plant.

Marmon Executives Back New Air Line to Detroit

INDIANAPOLIS, March 30—Development of a Detroit-Indianapolis air line is under consideration here, the new line having the backing of a group of Marmon Motor Car Co. executives of whom Hal L. Pardy is the leading spirit. By operation of the air line the time between the two cities would be shortened from the present nine-hour train time to three hours.

Plans of the company call for the operation of two planes, each making round trips daily. Two Stinson model planes have been inspected. These have four-passenger capacity.

Speedster Output Starts

DETROIT, April 1—Hudson Motor Car Co. is now in production on the new Essex two-passenger speedster. This model is equipped with a higher rear axle gear ratio than the other cars in the Essex line and is guaranteed to do 70 m.p.h. Price is \$700. Equipment includes engine heat indicator, dash fuel gage and stop light.

Toledo Plants Active

TOLEDO, March 29—Employment in Toledo has reached a new high peak with 31,940 employed in 51 plants which report each week—the highest point reached in the last five years and 20 per cent greater than at the same time last year.

Establish Atlanta Branch

ATLANTA, March 30—Marlin-Rockwell Corp. has established a branch here in charge of C. A. Letz, southern representative, to permit quicker shipments from stock of small orders.

Kelsey-Hayes Deal Waits Federal O.K.

NEW YORK, March 31—Merger plans of Kelsey Wheel Co. and the Hayes Wheel Co. have progressed so far that only the approval of the Federal Trade Commission needs to be obtained before the deal actually can be consummated, it is learned here. Bankers interested in the transaction will appear before the commission in Washington today to ask official sanction. Terms of the merger are reported to have been worked and an announcement of the plans will be made shortly if the commission's sanction of the deal is approved.

Jordan to Bring Output to 80 Daily in April

CLEVELAND, March 30—According to Edward S. Jordan, president of Jordan Motor Car Co., business of the company has been increasing each week since Jan. 31 when the price of the line eight was reduced. The factory is building 50 cars a day and this schedule will be increased to 80 early next month. Jordan reports orders for the new series as well as for the present models in sufficient volume to keep the factory at capacity for the next 90 days.

The regular quarterly preferred dividend of 1½ per cent was declared late last week. It is payable April 1 to stock of record March 28.

Chandler Sees Big Year

CLEVELAND, March 30—Since the beginning of January, 1927, production officials at the Chandler factories have found it necessary to expand their factory personnel by the addition of 1000 men in order to keep pace with the demand for new Chandler eights and sixes. Sid Black, general sales manager, said orders on hand for immediate delivery from distributors and dealers have never been as large as they are at present.

March Retail Sales Run Close to Normal

(Continued from page 500)

same products from the United States for the same periods.

An optimistic outlook for the second quarter also is fortified by the good condition of dealer stocks already mentioned and by the encouraging upward trend of sales recorded in many sections of the country as the first quarter ends and the second begins. Telegraphic reports from special *Automotive Industries'* correspondents in various parts of the country indicate:

NEW YORK

New car sales in the metropolitan area, aided by excellent weather in March, showed tremendous gains over February. Total sales in the first two weeks of the month are reported by Sherlock & Arnold as 4615 against 5008 for the entire month of February. The record in the first two weeks of March, 1926, was 4182 cars. Except in the case of two or three lines in which particularly aggressive sales campaigns have been waged, used car stocks generally were reduced during March, although they are still slightly ahead of the same period a year ago. Sales of the used vehicles have been tending upward along with the new car sales curve. Local business conditions are extremely favorable to the sale of motor cars. Truck branches and dealers in the metropolitan area are in excellent condition.

BOSTON

Retail sales, which showed a tendency to pick up in February, have shown some gain during March, but it has not been as large as the majority of dealers expected. Following the show there was a general drive to close up orders. In some half a dozen lines covering different price ranges, business has increased over that of a year ago. With others it has been even or just under. Some of the Ford dealers report that they are not doing the business they anticipated.

The used car situation is better now than it was a year ago. Most of the dealers have continued lowering their stocks so that the aggregate on motor row is on an average of 35 per cent under 1926.

Truck sales are reported as satisfactory. New England has not opened up to any great extent in Maine, New Hampshire and Vermont.

DETROIT

Favorable spring weather has resulted in increased new and used car sales in Michigan in March as compared with February. Sales will not equal March of last year owing to the fact that many men in the industrial districts, especially Detroit, are out of employment. There are 44,000 fewer men employed in Detroit industrial plants than there were a year ago. Dealers throughout the state are confident that April will continue to show increased sales.

CHICAGO

New car sales for March in Chicago and its immediate territory showed another upward climb, compared with February, according to reports by representative distributors and dealers. It is apparent that a large portion of the trade is beginning to hit a normal stride for the season. Some dealers have written an unusually large amount of early new car business and

many deliveries of winter orders have been made. Periods of good weather have stimulated both new and used car business. There has been some improvement in truck sales both in the city and outlying regions. Expected improvement in general industrial activity should brace up this and other lines of automotive selling.

MILWAUKEE

March sales of passenger cars, if Ford sales are left out of the picture, easily held their own with a year ago. The total, including Ford, was somewhat lower, as in January and February, but increases in Chevrolet sales and in about half of the remaining makes more than compensated for the decline in Ford sales. Wisconsin dealers were favored during the first half of March by ideal spring weather, and by a gradually improving general business situation, although as the month came to a close, a belated blizzard followed by colder weather, seemed to affect sales adversely, while the disturbance created by the speculation concerning Ford plans, the Durant threat, and expectancy of a price war has dampened enthusiasm somewhat.

MINNEAPOLIS

Soft roads following snow tieups have put a temporary stop to actual driving, even of buses, in some parts of the Minneapolis automobile distribution district, but it has not cut down appreciably, delivery to retailers of automobiles by leading makers. Although there are declines in some makes there are gains in others. The situation seems to be a see-saw in the matter of monthly registrations of new cars. The used car business is good and a move is being made to standardize the method of taking in and reselling these cars. Roads are still bad enough to hinder the sales of accessories by traveling men and trucks are barred from other than paved roads by state commission order.

ST. LOUIS

Sales of new and used automobiles during March showed a healthy increase over sales during February and were about 10 to 12 per cent in advance of sales in March, 1926. Better weather and intensive sales effort at the recent automobile show were the major factors in the business betterment. Stocks of used cars showed a decline and stocks of new cars are just large enough to make deliveries satisfactory. Ford sales are still below normal, but Chevrolet sales have increased to such an extent that total sales in the territory have not suffered.

Truck sales did not show an increase as did passenger car sales and the situation regarding trucks is not encouraging.

General business in the territory picked up during March and there is a feeling of cheerfulness in all lines.

NEW ORLEANS

A careful analysis of the automotive situation in New Orleans for the month of March indicates a healthy upward trend in the business in general. There has been an increase in sales of passenger cars estimated at 28 per cent. The improvement is largely attributable to the improved condition of cotton and sugar crops and prices.

An analysis of the truck field indicates

that there has been an increase in the sale of light trucks of about 12 per cent over that of last month, and an increase of approximately 20 per cent in the sale of heavy trucks, over that of last month, which is slightly better than the truck sales of the same period of last year.

The beginning of March showed the used car market to be in a rather unsatisfactory condition in the city, but intense sales efforts conducted in the latter part of the month have moved a large part of the stock, though some undoubtedly has been sold at a loss.

DALLAS

Automobile business in Texas and parts of adjoining states, except in localities stimulated by annual motor shows, was slower during the past 30 days than for the same period a year ago, with the exception of a few makes of cars. Ford sales showed a decided slump when compared with same time a year ago and with last month. Chevrolet sales showed a big increase. Reports on business in all lines showed new car sales 5 per cent less than last year, and used car sales 6 per cent less. Truck sales were 5 per cent below same month last year and about same as for last month.

LOS ANGELES

March new car sales throughout southern California are running appreciably ahead of the previous two months, but the total will run under March last year by more than 10 per cent. Ford sales are considerably under March of last year, with Chevrolet still showing substantial sales record. Used cars are moving fairly well. General business is reasonably good. New truck sales show increases compared with February and January. Total still far under March last year. Used trucks also moving slowly.

SAN FRANCISCO

New car sales for March are about 12 per cent better than for February, but still no better if as good as those of March last year. Owing to intensive salesmanship, Buick sales have held up well and due to new models Chevrolet is selling up to its expected increase. Other cars, including Fords, are going slowly. Rebuilt used car sales are below the average for preceding months of this year, according to dealers. Used cars offered "as is" are not moving. Due to prospect of record crops of all kinds, trucks are selling somewhat above February and considerably better than in March last year. Used trucks are always in demand on the coast.

SEATTLE

Pacific Northwest new car sales are averaging 10 per cent more for the first quarter than in the same period last year, with Ford sales 17 per cent less and Chevrolet 40 per cent more. The used car market is in good shape if dealers meet public price conception. Truck sales are more active after slow business in January and February. The credit situation is fairly good with repossession at the lowest figure in years. Good weather conditions in farming area stimulated inquiries from agricultural districts and firming of prices in lumber industry has helped west of the Cascade Mountains.

Exports, Imports and Reimports of the Automotive Industry for February of Current Year and Total for Two Months Ending February, 1927

	Month of February 1926		Month of February 1927		Two Months Ending February 1926		Two Months Ending February 1927	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories.....	..	\$28,658,568	..	\$30,967,195	..	\$54,311,115	..	\$60,108,540
Electric trucks and passenger cars.....	4	2,665	10	11,210	7	9,343	17	21,995
Motor trucks and buses, except electric....	..	..	..	..	..	..	..	..
Up to 1 ton, inclusive.....	4,640	2,086,764	8,967	4,173,185	8,697	3,980,233	14,763	6,864,837
Over 1 to 2 1/2 tons.....	1,074	1,399,796	1,011	1,326,820	1,962	2,648,790	2,607	3,272,103
Over 2 1/2 tons.....	163	627,872	142	524,691	359	1,216,269	463	1,379,298
Total motor trucks and buses, except electric	5,877	4,114,432	10,120	6,024,696	11,018	7,845,292	17,833	11,516,238
PASSENGER CARS								
Passenger cars, except electric:	..	..	..	..	..	..	..	..
Value up to \$500, inclusive.....	11,017	4,020,071	7,127	3,011,727	22,239	8,119,316	16,734	6,389,325
Value over \$500 to \$800.....	5,011	3,438,557	6,573	4,148,274	9,181	6,466,461	12,508	8,232,790
Value over \$800 to \$1200.....	4,905	5,245,519	5,370	4,954,059	9,483	10,080,157	10,440	10,160,794
Value over \$1200 to \$2000.....	972	1,440,580	1,706	2,218,015	1,840	2,752,295	2,638	3,681,655
Value over \$2000.....	450	1,233,068	579	1,457,057	779	2,122,258	1,157	3,072,053
Total passenger cars, except electric.....	22,355	15,377,795	21,355	15,789,132	43,522	29,540,487	43,477	31,536,617
PARTS, ETC.								
Parts, except engines and tires.....	..	..	..	..	..	..	..	..
Automobile unit assemblies.....	..	4,505,118	..	4,058,505	..	7,688,506	..	6,884,074
Automobile parts for replacement.....	..	2,780,891	..	3,276,644	..	5,611,698	..	7,072,994
Automobile accessories.....	..	656,178	..	708,824	..	1,445,517	..	1,300,439
Automobile service appliances (n. e. s.)....	..	437,955	..	566,642	..	796,079	..	1,314,989
Station and warehouse motor trucks.....	7	8,267	15	2,853	20	16,250	32	23,994
Trailers.....	99	29,365	49	24,781	263	66,407	189	71,664
Airplanes, seaplanes and other aircraft.....	2	48,118	3	15,041	19	64,243	8	57,262
Parts of airplanes, except engines and tires	..	19,371	..	51,606	..	44,929	..	74,373
BICYCLES, ETC.								
Bicycles and tricycles.....	324	10,764	330	9,145	709	21,920	575	16,422
Motor cycles.....	2,492	537,071	1,683	370,175	4,722	1,024,002	3,293	733,687
Parts, except tires.....	..	164,462	..	107,744	..	322,545	..	213,716
INTERNAL COMBUSTION ENGINES								
Stationary and Portable	..	..	..	..	..	..	..	..
Diesel and Semi-Diesel.....	30	145,801	18	66,763	128	271,528	44	215,323
Other stationary and portable:	..	..	..	..	..	..	..	..
Not over 10 HP.....	2,053	169,710	1,734	189,927	3,858	346,146	3,934	390,101
Over 10 HP.....	197	160,181	85	86,015	461	384,197	212	176,291
Automobile engines for:	..	..	..	..	..	..	..	..
Motor trucks and buses.....	47	23,162	771	64,241	718	85,280	1,046	93,392
Passenger cars.....	13,280	1,198,327	8,254	1,033,943	22,456	2,084,992	13,519	1,682,791
Tractors.....	165	82,396	83	5,835	190	99,604	195	104,223
Aircraft.....	16	48,118	3	15,041	19	64,243	8	57,626
Accessories.....	..	276,627	..	352,961	..	547,169	..	692,493
IMPORTS								
Automobiles and chassis (dutiable).....	38	97,706	36	62,672	121	180,806	70	119,020
Other vehicles and parts for them (dutiable)	..	5,473	..	8,246	..	6,860	..	14,052
REIMPORTS								
Automobiles (free from duty).....	12	16,666	15	45,470	25	47,569	24	52,630

White Export Business

Increased 30% in 1926

CLEVELAND, March 26—Truck and bus business is increasing rapidly in foreign countries, according to Jay Rathbun, vice-president of the export region of White Motor Co. Thirty per cent more trucks and motor buses were exported in 1926 than were exported the previous year and 1927 has started with indications of a big year. The 30 per cent increase in White deliveries embraced all the important truck using industries and there was a constant growth in bus business, said Mr. Rathbun.

The export region includes practically all foreign countries with distributors in 80 cities. Direction from Cleveland headquarters is through region division managers in Buenos Aires, Sydney, Auckland, Johannesburg, Manila and Stockholm.

Robert L. Boughton has been appointed assistant to the vice-president of the export region of the White Motor Co., it was announced today.

To Make Disk Roller

YOUNGSTOWN, OHIO, March 28—Aetna-Standard Engineering Co. reports receipt of an order for a disk rolling machine for producing steel disks and spun tubular shapes, the order coming from a large automobile manufacturer. The rolled parts are to replace parts formerly made of steel castings or

pressed steel. The machine is an adaptation of a seamless tube manufacturing unit.

Packard 6 Months Net Shows Drop to \$5,909,038

DETROIT, March 28—Packard Motor Car Co. reports for the six months ended Feb. 28, 1927, net profit of \$5,909,038 after depreciation, Federal taxes, etc., equivalent to \$1.96 a share (par \$10) earned on 5,004,264 shares. This compares with \$8,002,358 or \$3.06 a share on 2,614,722 shares in same period of 1926.

For the quarter ended Feb. 28, 1927, net income was \$2,073,563 after above charges, equal to 69 cents a share, comparing with \$3,835,475 or \$1.27 a share in preceding quarter and \$3,122,849 or \$1.19 a share on 2,614,722 shares outstanding in corresponding quarter of previous year.

Kelsey 1926 Net \$809,334

DETROIT, March 28—Kelsey Wheel Co., Inc., reports net profit of \$809,334 for 1926 after deducting all charges and allowing for taxes. This compares with \$1,357,284 in 1925. The balance sheet shows current assets of \$5,828,678 as compared with current liabilities \$699,996. In his report to stockholders, G. W. Kennedy, president, said the plants had been improved and new equipment added, making the outlook for 1927 very satisfactory.

Finds Italian Factories Overestimated Market

WASHINGTON, March 28—Italian automobile manufacturers must depend upon foreign exports for 75 per cent of their production, according to a report received this week by the U. S. Department of Commerce from its trade commissioner at Rome. As a result they are in keen competition with American manufacturers for the European export business, but are steadily losing ground, it was reported.

"The automobile industry of Italy has gone through a serious crisis in regard to business conditions during the past few months," the commissioner reported. The market was overestimated and production was consequently higher than it should have been. Instead of a program for expansion in 1927, an attitude of marking time has been adopted."

T. C. McMillan

MILWAUKEE, March 26—Thomas C. McMillan, manager of the Milwaukee factory branch of Willys-Overland, Inc., and one of the best known men in the midwestern automotive trade, died March 25 following an operation for appendicitis. Mr. McMillan was born in Milwaukee in 1878 and entered the industry more than 20 years ago as a member of the staff of George W. Browne, head of the Overland Wisconsin Co.

Men of the Industry and What They Are Doing

C. A. Jones Directing Head of Seiberling of Canada

Clifford A. Jones has been appointed vice-president and managing director of the new Seiberling Rubber Co. of Canada, Ltd. Negotiations were recently completed with the K. & S. Rubber Goods Co. of Toronto, whereby the Akron concern takes over the K. & S. factories. Among others of the Seiberling organization who will be transferred to the Seiberling-Canada firm are R. J. Thomas, who becomes secretary and treasurer, and W. W. Sanders, who is to be factory manager of the Toronto plant.

K. & S. has enjoyed substantial business for 10 years, its 1926 volume totaling \$2,500,000, or 12 per cent of the total Canadian dealer tire business. The firm ranks fourth in a field of seven Canadian tire manufacturers, and operates five branches.

Mr. Jones, who resigns as assistant general sales manager of the Akron company, has had 20 years of experience in the rubber industry.

Oberheu Visits Branches

Fred A. Oberheu, sales manager of United Motors Service, Inc., is on a six weeks' trip through the southern and western sections of the United States and western Canada to obtain information on field conditions in those regions. During his trip Mr. Oberheu will visit more than a dozen central control branches of United Motors Service besides many authorized distributors and service stations, to study new sales and service policies worked out at the national convention held in Detroit during the winter to celebrate the tenth anniversary of the organization.

Blunden Heads Branch

L. J. Blunden has been appointed manager of the Chicago branch of Olds Motor Works, succeeding C. H. Hurst, who died recently. Mr. Blunden entered the industry in 1907 as territorial representative in Detroit for the old U. S. Motors Co.

Jarosch Engineering Head

Frank Jarosch has been appointed chief engineer of the S. B. R. Specialty Co., East Orange, N. J. Mr. Jarosch was formerly factory manager of the Gurney Ball Bearing Co. and later headed a ball-bearing importing company under his own name.

Penn Offers Fuel Course

PHILADELPHIA, March 26—The University of Pennsylvania has announced a one-year course in fuel engineering leading to degree of master of science in fuel engineering. This course will be given at the Towne Scientific School.

WYATT TO ORGANIZE TRANSPORT CONGRESS

Horace E. Wyatt has been appointed organizer of the Fourth World Motor Transport Congress which will be held in London next November under the auspices of the Society of Motor Manufacturers & Traders, Ltd. Mr. Wyatt has been associated with the British branch of the industry since 1905. In recent years he has served as a publicity agent in promoting British overseas business as managing director of the British Commercial News Association, Ltd. Mr. Wyatt was honorary organizing secretary of the Imperial Motor Transport Conferences held in London in 1913 and 1920.

Eddins on Coast Trip

A party of Oldsmobile officials, headed by D. S. Eddins, vice-president and general sales manager, are on a visit to the Pacific Coast. The first stop was San Francisco where a dealer meeting was held this week. The meeting inaugurated the spring selling season and was attended by dealers throughout the San Francisco branch territory which includes all of California and part of Nevada. The meeting also afforded dealers an opportunity to inspect the new Oldsmobile branch in San Francisco.

P-A Engineers Change

Charles L. Sheppy, chief engineer of the Pierce-Arrow Motor Car Co., has been given two or three months' leave of absence to recuperate from illness. His place will be filled by John C. Talcott, chief experimental engineer, and W. Whitney Slaght, chief passenger car experimental engineer, will assume Mr. Talcott's work pending the return of Mr. Sheppy.

Steel With Ohio Carbon

H. V. Steel is now acting as sales representative in the southern district for the Ohio Carbon Co. succeeding G. G. Freeman, whose territory was divided to permit of greater concentration on sales development.

Auburn Names Gribben

A. E. Gribben has been appointed eastern sales manager for the Auburn Automobile Co., with headquarters in New York and jurisdiction over the New York and New England territory.

Durant on Committee

William C. Durant has been elected a member of the executive committee of the Petroleum Heat & Power Co.

Dodge Brothers Elects New Dealers to Board

C. Russell Dashiell, Chicago, and Samuel S. Thornton, Philadelphia, Dodge Brothers dealers, have been elected to the board of directors of Dodge Brothers, Inc., succeeding C. M. Bishop, Brooklyn, and F. S. Albertson, Los Angeles.

A year ago the company announced a plan of giving its dealers representation in the management of the company and the election of Mr. Dashiell and Mr. Thornton indicates that the company is continuing its plan. The company will rotate the dealer-directors in office from year to year so that every section of the country will be represented.

Both men are original Dodge Brothers dealers, having been identified with the sale of Dodge Brothers motor cars since 1914. Mr. Thornton is identified with the Thornton-Fuller Co., of Philadelphia. His 1914 contract called for the delivery of 400 cars and last year his contract included 7800 automobiles.

Mr. Dashiell is president of the Dashiell Motor Co., of Chicago. His total sales the first year were 900 cars while they aggregated 9600 in 1926.

Rawson on Long Trip

R. A. Rawson, sales manager of the Elcar Motor Co., is visiting dealers in all large cities east of the Rockies. Business is good in practically all sections except where local conditions have arisen which have caused temporary delays, he reports.

H. C. Beaver Honored

Harry C. Beaver, vice-president in charge of operations of Rolls-Royce of America, Inc., at Springfield, Mass., has been elected president of the western Massachusetts branch of the National Metal Trades Association.

Haldenby Returns

Thomas Shaw Haldenby, engineer for Rolls-Royce, Ltd., at Derby, Eng., has returned to England after spending several months at the plant of Rolls-Royce of America, Inc., at Springfield, Mass.

Marshall Joins American

H. W. Marshall has joined American Hammered Piston Ring Co. and will take over the middle western sales territory including Kansas, Oklahoma, Arkansas and part of Missouri. Mr. Marshall was formerly with Anderson.

Niven on English Trip

A. M. Niven, a member of the Continental Motors Corp. engineering staff, is leaving New York on April 23 for a short business trip throughout Great Britain.

Steel Trade Sees Coal Strike Near

Sharp Increase in Prices Seen Likely Following Tight- ening of Supply

NEW YORK, March 31—Steel market opinion takes it for granted that April 1 will mark the beginning of a strike in the union coal fields. Predictions that if a strike does ensue it will have little influence on the steel market have been part of the daily market gossip for several weeks. Certain it is that coal shortage will not impair production during the coming month or two, for the simple reason that there is enough fuel in sight either in steel mills or blast furnace yards to make forced reduction in output highly improbable, beyond that point all certainty stops.

Those who have been saying in the last few weeks that they look for a long-drawn-out strike, but that it is not likely to have much effect on steel prices, are voicing sentiments difficult to reconcile with hard facts. In the strike of five years ago, coal prices were but little affected during the first month, but shortly thereafter the market's reaction became such that the Government was obliged to set up control. It may be well to remember, that during that strike at one time nearly three-quarters of the entire bituminous production of the country was involved.

No. 2 foundry iron, sold at the outbreak of the 1922 strike at \$19, valley. Six months later it sold at \$35. Cold-finished steel bars were held at 1.80 cents, Pittsburgh, when the strike broke out in April and in September commanded 2.50 cents. Full-finished automobile sheets advanced from 4.35 cents to 4.85 cents in the same period. Indications are that blast furnaces and steel mills are better stocked with fuel than they were at the beginning of the 1922 strike, but the records of the 1922 strike show that it did not take but a few weeks following its outbreak for prices to move to higher levels.

The impression prevails that the 1927 peak in steel production has been attained. Automotive demand continues to be the market's outstanding feature. Strip-steel mills are operating at capacity. Charles M. Schwab is quoted as saying that "the condition of the steel industry has never been better but prices are not as satisfactory as they might be" and adding: "I look for a recovery in the near future." If a coal strike does break out tomorrow, it may prove a handy peg on which to hang advances.

Pig Iron—While there has been some further buying by automotive foundries, the market as a whole is less animated and it looks as though the buying movement that set in early this month had about run its course.

Aluminum—Automotive demand for foundry metal and alloys is good but

sheets and coil are not quite as active. Prices rule steady. Stocks of imported metal in U. S. bonded warehouses are reported as normal. Considerable small lot buying is in evidence.

Copper—The copper market appears to be marking time. Connecticut Valley and Michigan brass mills, catering to the automotive industries, appear to be well provided with metal and are biding their time before reentering the market.

Tin—Recent declines were not sufficient to bring consumers into the market which is rather dull.

Lead—Fair storage battery demand is noted. The market is easy.

Finds Boycott Factor in Cutting Rubber Use

WASHINGTON, March 30—The British rubber monopoly can be satisfactorily combatted by American rubber manufacturers and automobile owners through voluntary conservation organized in collaboration with the Department of Commerce, that department announced here this week.

The announcement is based upon statistical information on the consumption of crude rubber last year, showing that although automobile registration last year was almost 10 per cent greater than in 1925, with a slightly larger output of tires, the net consumption of raw rubber showed sharp reductions as a result of the American boycott.

Rubber consumption in 1925 amounted to 388,000 tons. An equal rate of consumption, based upon the number of automobiles, in 1926 would have required nearly 426,000 tons. Consumption in 1926, however, fell to 366,000 tons, the report crediting a saving of 60,000 tons of crude rubber to the conservation measures.

That there was no hardship on car owners and users was shown by the fact that stocks of automobile casings held by manufacturers increased by 2,314,000 while inner tube stocks increased by 4,887,000, a further saving equaling 12,500 tons of rubber.

Urges Standard Containers

WASHINGTON, March 31—Packing of machine and carriage bolts and nuts in 18 standard size containers was recommended by a general conference of representatives of manufacturers, distributors and users at the U. S. Department of Commerce this week.

Such standardization would result in economies to the manufacturers and warehouses, it was stated. A standing committee of the industry was appointed to follow up the recommendation and report at the end of the year. Carl H. Taylor, of the General Motors Corp., represented the automotive industry.

Skinner Moves Office

NEW YORK, March 28—The New York office of the Skinner Chuck Co. has been moved to 86 Warren St., with Karl F. Lennhardt in charge.

Financial Notes

American Brake Shoe & Foundry Co. stockholders, at a special meeting April 22, will vote on a four-for-one split-up of common stock, on which the directors propose to pay \$1.60 a share yearly, equivalent to \$6.40 a share on the present amount. In addition, a stock dividend of 2 per cent on the new stock will be declared on the surplus. Directors expressed the hope that it will be possible to continue these 2 per cent stock dividends annually.

Dillon, Read & Co. as sinking fund agents, announce the redemption of \$750,000 of Goodyear Tire & Rubber Co. first mortgage 20-year 8 per cent sinking fund gold bonds, dated May 1, 1921. The bonds are payable on May 1, 1927, at the principal office of the Central Union Trust Co. of New York, or at the principal office of the Union Trust Co., Cleveland, Ohio, at 120 per cent and interest to May 1, 1927.

Rickenbacker Motor Co. stock was removed from the trading list of the New York Curb Market March 22, ending the Wall Street career of the company, organized in 1921. Under an order of the Federal court in Detroit, the property of the company is to be sold at auction there on April 14. The stock sold on the curb last Saturday at 13 cents. Last year it was as high as \$10 a share.

Eaton Axle & Spring Co. directors have declared the regular quarterly dividend of 50 cents a share on common stock, payable May 1 to stock of record April 15. President C. I. Ochs stated that sales for this quarter were in excess of sales for the same period of 1926 and that dividend requirements for the first half of 1927 will be earned in the first quarter.

The E. W. Bliss Co. reports for 1926 a net profit of \$1,397,705, after taxes, depreciation and idle plant expenses, which is equivalent after preferred dividends to \$3.33 a share earned on 356,270 no par shares of common stock, as compared with \$1,252,240, or \$3.33 a share earned on 300,000 shares in 1925, an increase of \$145,465 or 11.6 per cent.

Mack Acceptance Corp., subsidiary of Mack Trucks, Inc., in a statement filed with the Massachusetts Commissioner of Corporations, shows total assets of \$25,289,767, as of Dec. 31, 1926, comparing with \$27,844,219 at the end of the previous year and profit and loss surplus of \$659,175 against \$76,614.

International Harvester Co. reports net earnings of \$22,658,891 in 1926 as against \$20,671,241. The current assets showed cash of \$25,004,413, inventories \$88,713,535, receivables \$90,892 and investments of \$5,161,202. In 1925 cash totaled \$28,482,598, inventories \$84,629,124, receivables \$75,804,169, and investments \$5,616,765. Current liabilities totaled \$34,449,423 as against \$28,675,954 in 1925.

General Electric Co. reports net profits in 1926 as \$44,314,884, equivalent to \$6.14 a share, which compares with \$38,641,217 in 1925. Sales totaled \$326,974,104 as against \$290,290,166 in 1925. The best high previous record was in 1924 when sales, totaled \$299,251,869.

Dallas Air Mail Adds Passengers

KANSAS CITY, March 29—Air passenger service is expected to be inaugurated on the air mail line between Chicago and Dallas, Texas, by the end of April, according to an announcement made public here this week by R. W. Ireland, Chicago, general traffic manager of the National Air Transport, Inc., air mail contractors operating the line. Mr. Ireland was in Kansas City one day this week, following an inspection tour of the entire route.

The passenger service will probably be started on the line at once, when the eight monoplanes now under construction are completed by the Travel-Air Company of Wichita, Kansas. These planes are to carry four passengers in addition to the mail. The 3-motored Ford-Stout monoplane which has been in the hangar at Richards Field here for some time will also be used in the new service, Mr. Ireland said.

He said that National Air Transport also has several new plans under advisement but he was unable to disclose them because their completion has been forestalled pending the awarding of the New York-Chicago mail route. Mr. Ireland's recent inspection trip was for the purpose of investigating night flying possibilities.

Mr. Ireland stated that the government is lighting the route for night flying, which he estimates will be started on the Chicago-Dallas route about July 1.

Coming Feature Issues of Chilton Class Journal Publications

May 1—Automobile Trade Journal—Annual Big Small Town Market Number.

May 5—Motor Age—Annual Sales and Service Reference Number.

American Chain Action Dropped by Government

NEW YORK, March 28—Proceedings brought by the attorney general of the United States against the American Chain Co. to have the minimum price clauses of its bumper license contracts declared illegal, have been discontinued. The discontinuance was based upon a decision in a similar suit in 1926 in which it was held that a license agreement of a patentee is not in violation of the anti-trust laws.

N. Y. Warehouse Opens Service

NEW YORK, March 28—Arrow Head Steel Products Co. of New York has been organized with headquarters at 33 West Sixtieth St., to provide a complete warehouse service in the Metropolitan area for Arrow Head piston and pin assemblies. A. J. Balinger is in charge. The company also will be eastern warehouse agents for Foote Bros. Gear & Machine Co., Richmond Piston Ring Co. and Schlieder Mfg. Co.

Auto-Lite Quarter Exceeds 1926 Half

TOLEDO, March 26—No slackening in the automotive industry is seen in the second quarter of the year by C. O. Miniger, president of Electric Auto-Lite Co., who reported to stockholders at the annual meeting this week that March business was two-thirds greater than the best previous month in the company's history.

"I have good reason to believe that each of the three months in the second quarter will yield as large a volume of business as March," he said.

The company is producing more than 100,000 units in March. First quarter business surpassed the first half of last year.

President Miniger said that acquisition of the American Bosch starting, lighting and ignition division last year and consequent new building had evidently proved a very good investment viewed in the light of big production. He said the products were being sold to motor car manufacturers for less this year but that production costs had been correspondingly reduced. The \$1,400,000 of capital borrowed to effect the American Bosch deal will have been paid back out of earnings without affecting the current dividends within four months.

D. H. Kelly, vice-president, and Frank Landwehr, secretary, were elected to the board of directors when the board was enlarged to nine members.

Calendar of Coming Events

SHOWS

Atlantic City	June 4-10
Exhibition, Million Dollar Pier, National Electric Light Association.	
Barcelona	April 27-May 8
Budapest	June 4-15
Cleveland	Sept. 19-23
Exposition, Public Auditorium, National Machine Tool Builders' Ass'n.	
Cleveland	Oct. 3-7
Exhibition, Public Auditorium, American Electric Railway Ass'n.	
Cologne	May 20-31
International Commercial Transport Exhibition.	
London	Oct. 14-22
Olympia Passenger Car Show.	
London	Nov. 17-26
Olympia Truck Show.	
Melbourne	May
International Motor Show.	
New Haven, Conn.	Sept. 6-9
Machine Tool Exhibition.	
Paris	Oct. 6-16
Grand Palais.	
Riga	April 10-17

CONVENTIONS

American Automobile Association, Annual Meeting, Ritz-Carlton Hotel, Philadelphia	June 16-17
American Electric Railway Association, Public Auditorium, Cleveland	Oct. 3-7
American Gear Manufacturers Association, Annual Meeting, Hayes Hotel, Jackson, Mich.	May 12-14
American Society of Mechanical Engineers, White Sulphur Springs, W. Va.	May 23-26
American Welding Society, Engineering Societies Bldg., New York City	April 27-29

Associated Automotive Engine Builders, Hotel Winton, Cleveland	May 26-28
Automotive Equipment Association Summer Convention, Multnomah Hotel, Portland, Ore.	June 27-July 2
Chamber of Commerce of the United States of America, Washington	May 2-5
Motor Truck Industries, Inc., Palmer House, Chicago	April 14
National Association of Automobile Show and Association Managers, Drake Hotel, Chicago	July 26-27
National Automobile Chamber of Commerce, Bus Meeting, New York	May 31
National Automobile Chamber of Commerce, Annual Meeting, New York	June 2
National Electric Light Association, Million Dollar Pier, Atlantic City	June 6-10
National Foreign Trade Council, Hotel Statler, Detroit	May 25-27
National Highway Traffic Association, Automobile Club of America, New York	April 15
National Safety Council, Stevens Hotel, Chicago	Sept. 26-30

S. A. E.

Buffalo, April 5—Magnesium—S. K. Colby.	
Buffalo, April 25-26—Aviation and Aeronautics—Joint meeting with Aeronautic Division American Society of Mechanical Engineers. Inspection trips.	
Chicago, April 12—Traffic—Carroll E. Robb.	
Cleveland, April 18—Air Travel as a Practical Means of Transport—Col. Paul Henderson.	

Dayton, April 21—Recent Developments in Lighter-than-Air Craft—Dr. Karl Arnstein.	
Detroit, April 7—Inspection Trip to General Motors Corp. plants in Flint, Mich.	
Detroit, April 27-28—Reducing Avoidable Waste in Production—Joint meeting with American Management Association.	
French Lick Springs, Ind., May 25-28—Summer meeting.	
Indianapolis, April 14—Chromium Plating—C. R. Umphreys; Engineering Relationship to Production, George Freers; Fabricating the High Grade Motor Car, Max Thoms and W. K. Swigert.	
New York, April 21—Highways and Vehicles—Dr. T. R. Agg and O. T. Kreusser.	
Milwaukee, April 6—Modern Aeroplane Power Plants—Major L. M. Woolson.	
Philadelphia, April 12—Traffic Problem—Harold M. Lewis.	

RACES

Abilene, Texas	July 4
Altoona, Pa.	June 11
Altoona, Pa.	Sept. 5
Atlantic City	May 7
Atlantic City	Sept. 24
Belgian Grand Prix, Spa-Francorchamps	July 9-10
British Grand Prix, Brooklands	Oct. 1
Charlotte, N. C.	July 18
Detroit	Sept. 10
French Grand Prix, Monthery	July 3
Indianapolis	May 30
Los Angeles	Nov. 27
Salem, N. H.	June 25
Salem, N. H.	Oct. 12
Syracuse, N. Y.	Sept. 3
Targa Florio, Sicily	April 24